UNITED STATES GOVERNMENT
MEMORANDUM

August 7, 2019

To: Public Information (MS 5030)

From: Plan Coordinator, FO, Plans Section (MS 5231)

Subject: Public Information copy of plan

- Control # - N-10070
- Type - Initial Exploration Plan
- Lease(s) - OCS-G35918 Block - 491 Garden Banks Area
  OCS-G35919 Block - 492 Garden Banks Area
- Operator - Kosmos Energy Gulf of Mexico Operations, LLC
- Description - Subsea Wells SL1,SL2,SL3,SL4,SL4
- Rig Type - Not Found

Attached is a copy of the subject plan.

It has been deemed submitted as of this date and is under review for approval.

Robert Arpino
Plan Coordinator

Site Type/Name	Botm Lse/Area/Blk	Surface Location	Surf Lse/Area/Blk
WELL/SL1	G35919/GB/492	1637 FSL, 105 FWL	G35919/GB/492
WELL/SL2	G35919/GB/492	1780 FSL, 192 FWL	G35919/GB/492
WELL/SL3	G35919/GB/492	2032 FSL, 1125 FEL	G35918/GB/491
WELL/SL4	G35919/GB/492	2918 FSL, 2569 FEL	G35918/GB/491
WELL/SL5	G35919/GB/492	1496 FSL, 3782 FWL	G35919/GB/492

PUBLIC COPY
June 2019

INITIAL EXPLORATION PLAN

Garden Banks Block 491 / 492
OCS-G 35918 / 35919
Resolution

Estimated Startup Date: September 1, 2019

SUBMITTED BY:
Kosmos Energy Gulf of Mexico Operations, LLC
Energy Crossing II
15011 Katy Freeway, Suite 700
Houston, Texas 77094

Bill Fisher
(281) 596-0933
bfisher@kosmosenergy.com

AUTHORIZED REPRESENTATIVE:
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15-A	Environmental Impact Analysis (EIA)

SECTION 1
PLAN CONTENTS

1.1 PLAN INFORMATION

Leases OCS-G 35918 and OCS-G 35919, Garden Banks (GB) Blocks 491 and 492 were issued in the Central Gulf of Mexico Lease Sale Number 248, effective December 1, 2016, with lease expiration dates of November 30, 2021.

Under this Joint Initial Exploration Plan, Kosmos Energy Gulf of Mexico Operations, LLC (Kosmos) as designated operator proposes to drill, complete and/or abandon five wells on Leases OCS-G 35918 and OCS-G 35919, GB Blocks 491 and 492, Well Locations SL 1, SL 2, SL 3, SL 4 and SL 5. ***The SL 4 and SL 5 are mirror locations and are intended as re-spud locations only.***

The wells are located in approximately 1,884 to 2,073 feet of water.

The OCS Plan Information Form BOEM-137 is included as **Attachment 1-A**.

1.2 LOCATION

Well Location Plats depicting the surface locations and bottomhole locations of the proposed wells, measured depths/true vertical depths and water depths are included as **Attachment 1-B**.

No anchors are associated with the activities proposed in this plan. A Bathymetry Map depicting the surface locations and water depths of the proposed wells is included as **Attachment 1-C**.

1.3 SAFETY AND POLLUTION PREVENTION FEATURES

Kosmos proposes to drill the wells with either a Dynamically Positioned Semi-Submersible or Drillship equipped with a Subsea BOP. Once a rig is determined, BOP information and schematics will be included as a part of the Application for Permit to Drill.

The rig will be equipped with safety and fire-fighting equipment required to comply with United States Coast Guard (USCG) regulations. Appropriate life saving equipment such as life rafts, life jackets, ring buoys, etc. as prescribed by the USCG, will be maintained on the rig at all times.

Safety features on the drilling unit will include well control, pollution prevention, and blowout prevention equipment as described in BSEE regulations 30 CFR 250 C, D, E, O, Q and S; and as further clarified by BSEE Notices to Lessees, and current policy making invoked by the BSEE, Environmental Protection Agency (EPA) and the USCG.

Pollution prevention measures include installation of curbs, gutters, drip pans, and drains on drilling deck areas to collect all contaminants and debris. Compliance will be maintained with the EPA NPDES Permit. The rig will be monitored daily and any waste or fuel resulting in pollution of the Gulf waters will be reported to the representative in charge for immediate isolation and correction of the problem. All spills will be reported to the appropriate governmental agencies.

1.4 STORAGE TANKS AND PRODUCTION VESSELS

The table below provides storage tanks with capacity of 25 barrels or more that will store fuels, oil and lubricants.

Type of Storage Tank	Type of Facility	Tank Capacity (bbl)	Number of Tanks	Total Capacity (bbl)	Fluid Gravity (API)
Fuel oil (marine diesel)	DP Semisubmersible	16,700	4	66,800	58°
Lube Oil		271	1	271	48°
Base Oil (for SBM)		3,200	1	3,200	68°
Jet Fuel		60	4	240	63°
BOP Control Fluid (Soluble Oil 3% - Water Mix 97%)		37	1	37	18-Baume
Main Fuel Oil	DP Drillship	18,000	2	36,000	No. 2 Diesel
Diesel Settling		837	2	1,674	
Diesel Day		837	2	1,674	
Emergency Diesel		100	1	100	
Diesel Overflow		823	1	823	
Diesel Oil Drain Aft		42	1	42	
Engine Oil Storage		182	1	182	26.2°
Gear Oil Aft		62	1	62	27°
Gear Oil Fwd		176	1	176	27°
Hydraulic Oil Aft		84	1	84	31°
Hydraulic Oil Fwd		87	1	87	31°

1.5 POLLUTION PREVENTION MEASURES

These operations do not propose activities for which the State of Florida is an affected state.

1.6 ADDITIONAL MEASURES

Kosmos does not propose any additional safety, pollution prevention, or early spill detection measures beyond those required by 30 CFR 250.

1.7 COST RECOVERY FEE

Documentation of the $18,365.00 cost recovery fee payment is included as **Attachment 1-D.**

Attachment 1-A

U.S. Department of the Interior
Bureau of Ocean Energy Management

OMB Control Number: 1010-0151
OMB Approval Expires: 6/30/2021

OCS PLAN INFORMATION FORM

General Information

Type of OCS Plan:		Exploration Plan (EP)		Development Operations Coordination Document (DOCD)			
Company Name: Kosmos Energy Gulf of Mexico Operations, LLC				BOEM Operator Number: 03362			
Address: Energy Crossing II				Contact Person: Kelley Pisciola			
15011 Katy Freeway, Suite 700				Phone Number: 281.698.8519			
Houston, TX 77094				E-Mail Address: kelley.pisciola@jccteam.com			
If a service fee is required under 30 CFR 550.125(a), provide the		Amount paid		$18,365.00	Receipt No.		26HQHSBC

Project and Worst Case Discharge (WCD) Information

Lease(s): OCS-G 35918 / 35919		Area: Garden Banks				Block(s):491 / 492		Project Name: Resolution	
Objective(s)	X	Oil		Gas		Sulphur		Salt	Onshore Support Base(s): Fourchon, LA
Platform / Well Name: SL 3			Total Volume of WCD: 36,584,000 bbls				API Gravity: 31°		
Distance to Closest Land (Miles): 144						Volume from uncontrolled blowout: 430,400 BOPD			

Have you previously provided information to verify the calculations and assumptions for your WCD?		Yes	X	No
If so, provide the Control Number of the EP or DOCD with which this information was provided				
Do you propose to use new or unusual technology to conduct your activities?		Yes	X	No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

Description of Proposed Activities and Tentative Schedule (Mark all that apply)

Proposed Activity	Start Date	End Date	No. of Days
Drill, and Complete or TA Location SL 3	09/01/2019	01/19/2020	140
Drill, and Complete or TA Location SL 1	06/01/2020	10/19/2020	140
Drill, and Complete or TA Location SL 2	06/01/2021	10/19/2021	140
Drill, and Complete or TA Location SL 4	06/01/2022	10/19/2022	140
Drill, and Complete or TA Location SL 5	06/01/2023	10/19/2023	140

Proposed wells SL 4 and SL 5 are intended as respud locations only.

Description of Drilling Rig

	Jackup	X	Drillship		Caisson		Tension leg platform
	Gorilla Jackup		Platform rig		Fixed platform		Compliant tower
	Semisubmersible		Submersible		Spar		Guyed tower
X	DP Semisubmersible		Other (Attach description)		Floating production system		Other (Attach description)
Drilling Rig Name (If known):							

Description of Lease Term Pipelines

From (Facility/Area/Block)	To (Facility/Area/Block)	Diameter (Inches)	Length (Feet)

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): SL 1					Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.				
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 430,400	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	31°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 35919		OCS OCS
Area Name	Garden Banks		
Block No.	492		
Blockline Departures (in feet)	N/S Departure: 1,637' FSL		N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 105' FWL		E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 1,457,385'		X: X: X:
	Y: 9,964,997'		Y: Y: Y:
Latitude/ Longitude	Latitude: 27° 27' 35.791" N		Latitude Latitude Latitude
	Longitude: 93° 33' 52.538" W		Longitude Longitude Longitude
Water Depth (Feet):			MD (Feet): MD (Feet): MD (Feet):
Anchor Radius (if applicable) in feet:			TVD (Feet): TVD (Feet): TVD (Feet):

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): SL 2					Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.				
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day) 430,400 bbls/day:	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	31°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 35919		OCS OCS
Area Name	Garden Banks		
Block No.	492		
Blockline Departures (in feet)	N/S Departure: 1,780' FSL		N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 192' FWL		E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 1,457,472'		X: X: X:
	Y: 9,965,140'		Y: Y: Y:
Latitude/ Longitude	Latitude: 27° 27' 37.211" N		Latitude Latitude Latitude
	Longitude: 93° 33' 51.579" W		Longitude Longitude Longitude
Water Depth (Feet):			MD (Feet): MD (Feet): MD (Feet):
Anchor Radius (if applicable) in feet:			TVD (Feet): TVD (Feet): TVD (Feet):

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): SL 3					Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.				
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 430,400 bbls/days	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	31°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 35918		OCS OCS
Area Name	Garden Banks		
Block No.	491		
Blockline Departures (in feet)	N/S Departure: 2,032' FSL		N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 1,125' FEL		E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 1,456,155'		X: X: X:
	Y: 9,965,392'		Y: Y: Y:
Latitude/ Longitude	Latitude: 27° 27' 39.648" N		Latitude Latitude Latitude
	Longitude: 93° 34' 06.217" W		Longitude Longitude Longitude

Water Depth (Feet):		MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:			

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): SL 4					Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.				
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 430,400 bbls/days	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	31°

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 35918		OCS OCS
Area Name	Garden Banks		
Block No.	491		
Blockline Departures (in feet)	N/S Departure: 2,918' FSL		N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 2,569' FEL		E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 1,454,711'		X: X: X:
	Y: 9,966,278'		Y: Y: Y:
Latitude/ Longitude	Latitude: 27° 27' 48.359" N		Latitude Latitude Latitude
	Longitude: 93° 34' 22.297" N		Longitude Longitude Longitude
Water Depth (Feet):			MD (Feet): MD (Feet): MD (Feet): / TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:			

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): SL 5					Previously reviewed under an approved EP or DOCD?		Yes	X	No
Is this an existing well or structure?		Yes	X	No	If this is an existing well or structure, list the Complex ID or API No.				
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?						X	Yes		No

WCD Info	For wells, volume of uncontrolled blowout (Bbls/Day): 430,400 bbls/day	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	31°

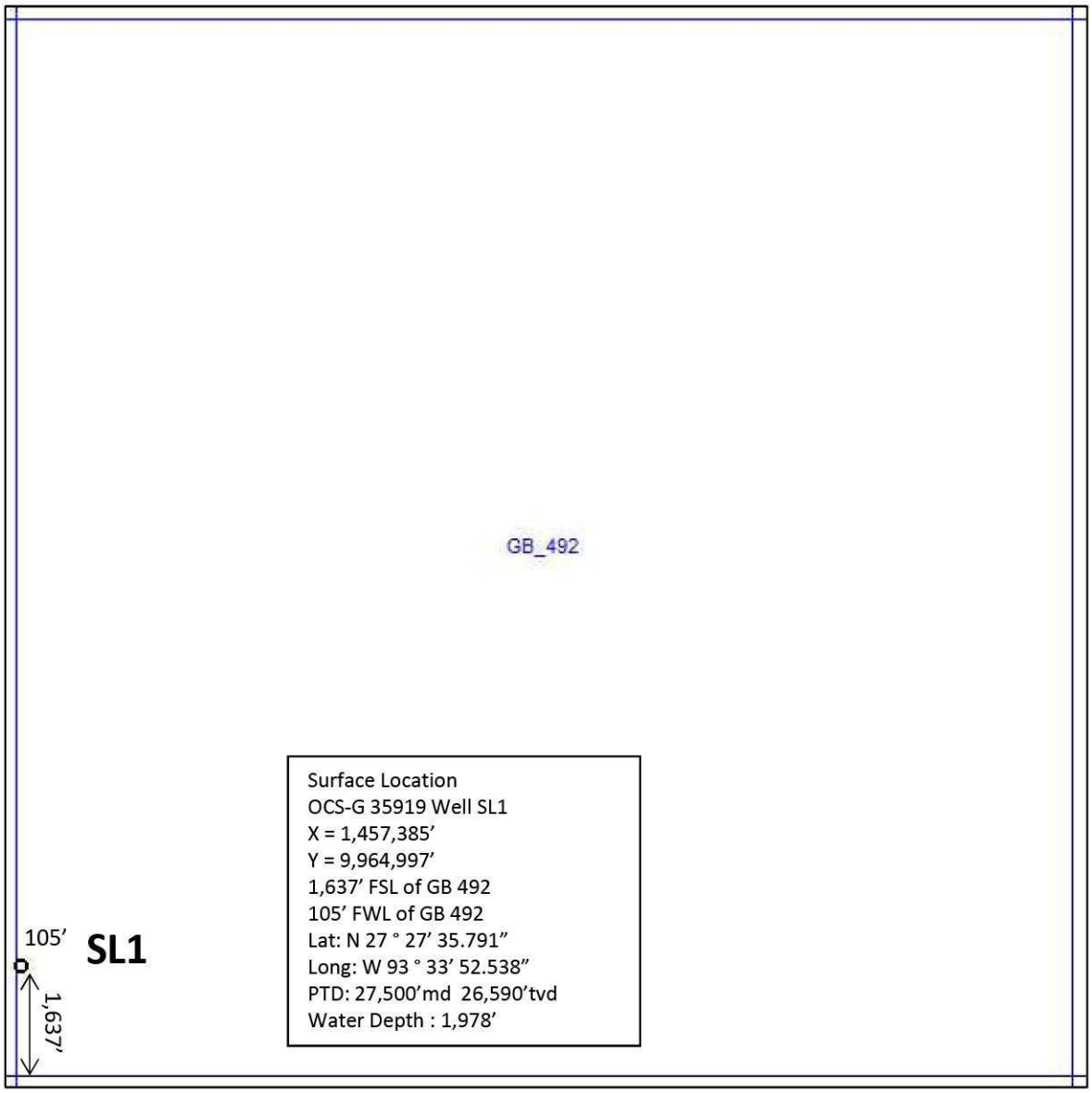
	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS-G 35919		OCS OCS
Area Name	Garden Banks		
Block No.	492		
Blockline Departures (in feet)	N/S Departure: 1,496' FSL		N/S Departure F __ L N/S Departure F __ L N/S Departure F __ L
	E/W Departure: 3,782' FWL		E/W Departure F __ L E/W Departure F __ L E/W Departure F __ L
Lambert X-Y coordinates	X: 1,461,062'		X: X: X:
	Y: 9,964,856'		Y: Y: Y:
Latitude/ Longitude	Latitude: 27° 27' 34.558" N		Latitude Latitude Latitude
	Longitude: 87° 33' 11.700" W		Longitude Longitude Longitude

Water Depth (Feet):		MD (Feet): MD (Feet): MD (Feet):	TVD (Feet): TVD (Feet): TVD (Feet):
Anchor Radius (if applicable) in feet:			

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	
			X:	Y:	

Attachment 1-B



KOSMOS ENERGY GOM OPERATIONS, LLC

GB 492

'SL1' Well Surface Location Map

Scale = 1:24000

0 2000 4000 6000 ft

KOSMOS ENERGY GOM OPERATIONS, LLC

GB 492

'SL2' Well Surface Location Map

Scale = 1:24000

0 2000 4000 6000 ft

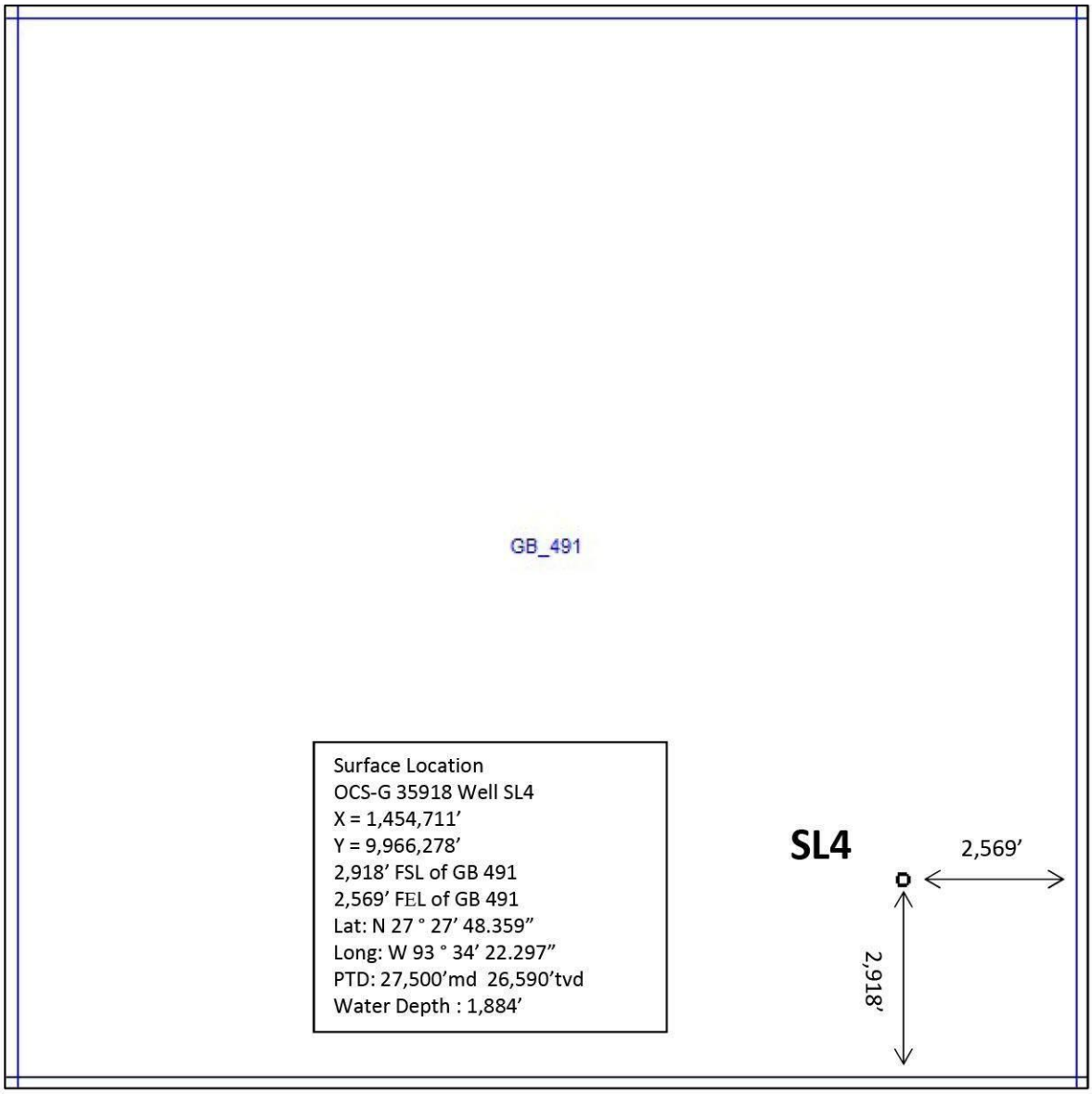
KOSMOS ENERGY GOM OPERATIONS, LLC

GB 491

'SL3' Well Surface Location Map

Scale = 1:24000

0 2000 4000 6000 ft



KOSMOS ENERGY GOM OPERATIONS, LLC

GB 491

'SL4' Re-Spud Well Surface Location Map

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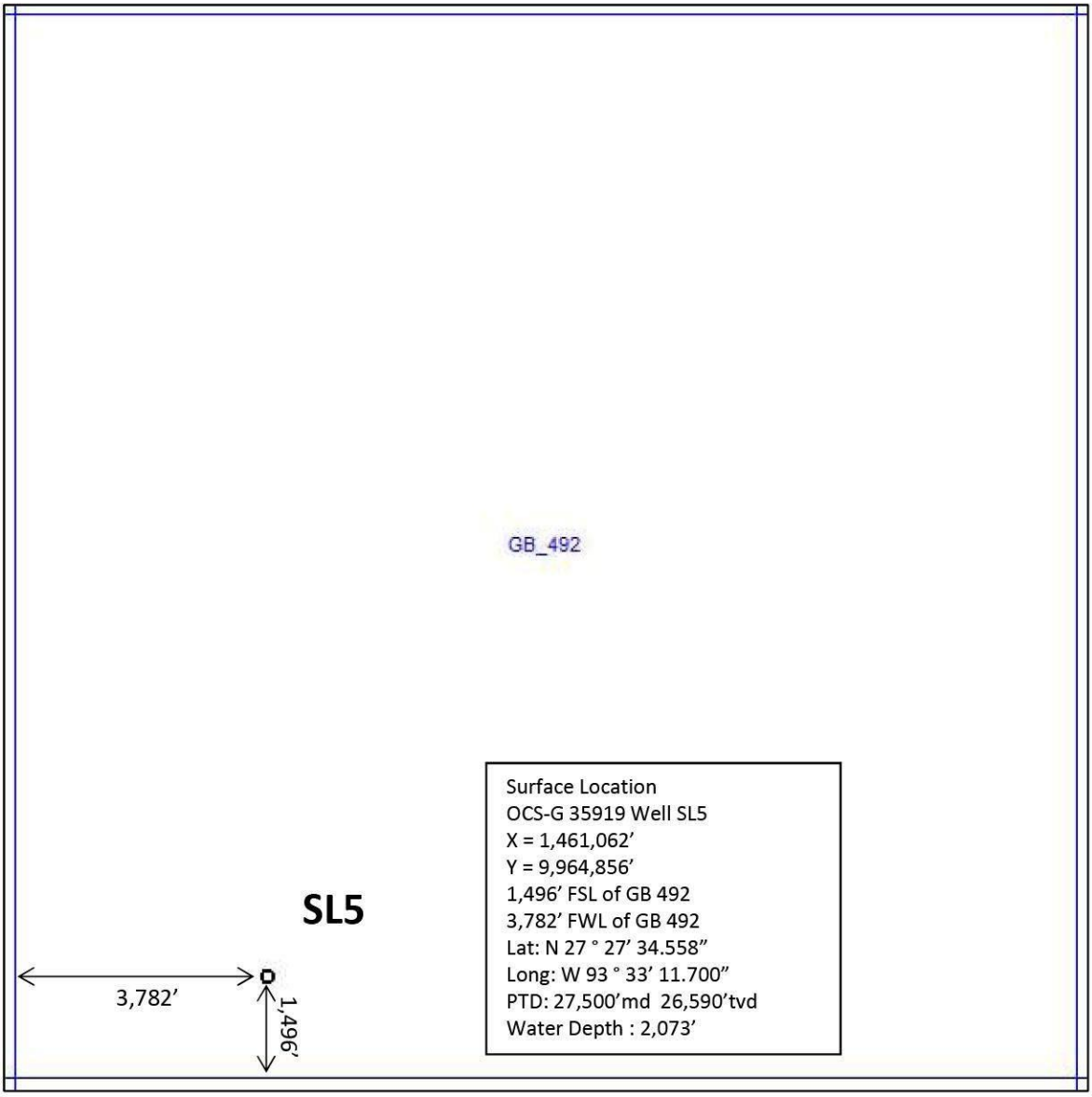

KOSMOS ENERGY GOM OPERATIONS, LLC

GB 492

'SL5' Re-Spud Well Surface Location Map

Scale = 1:24000

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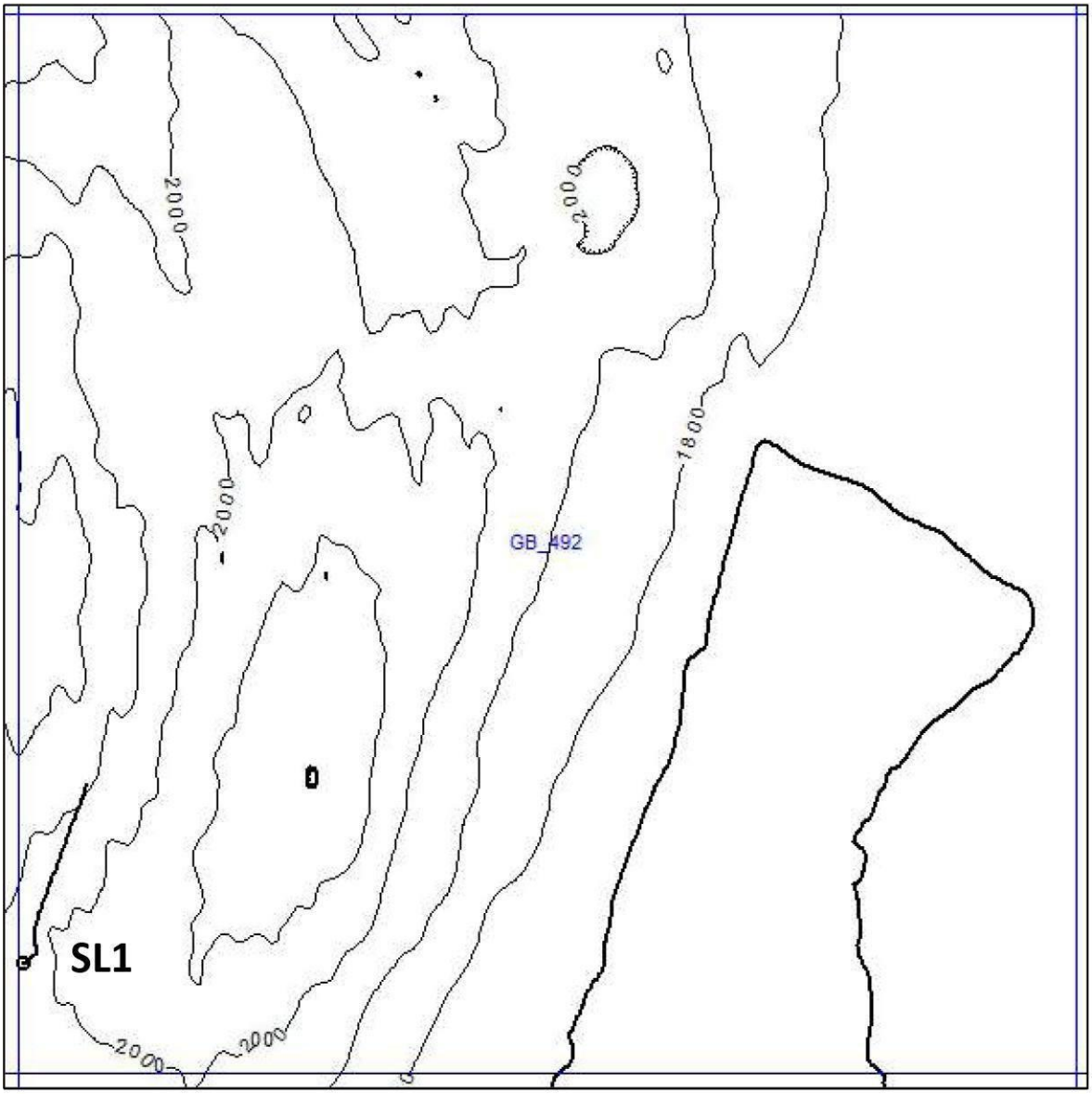
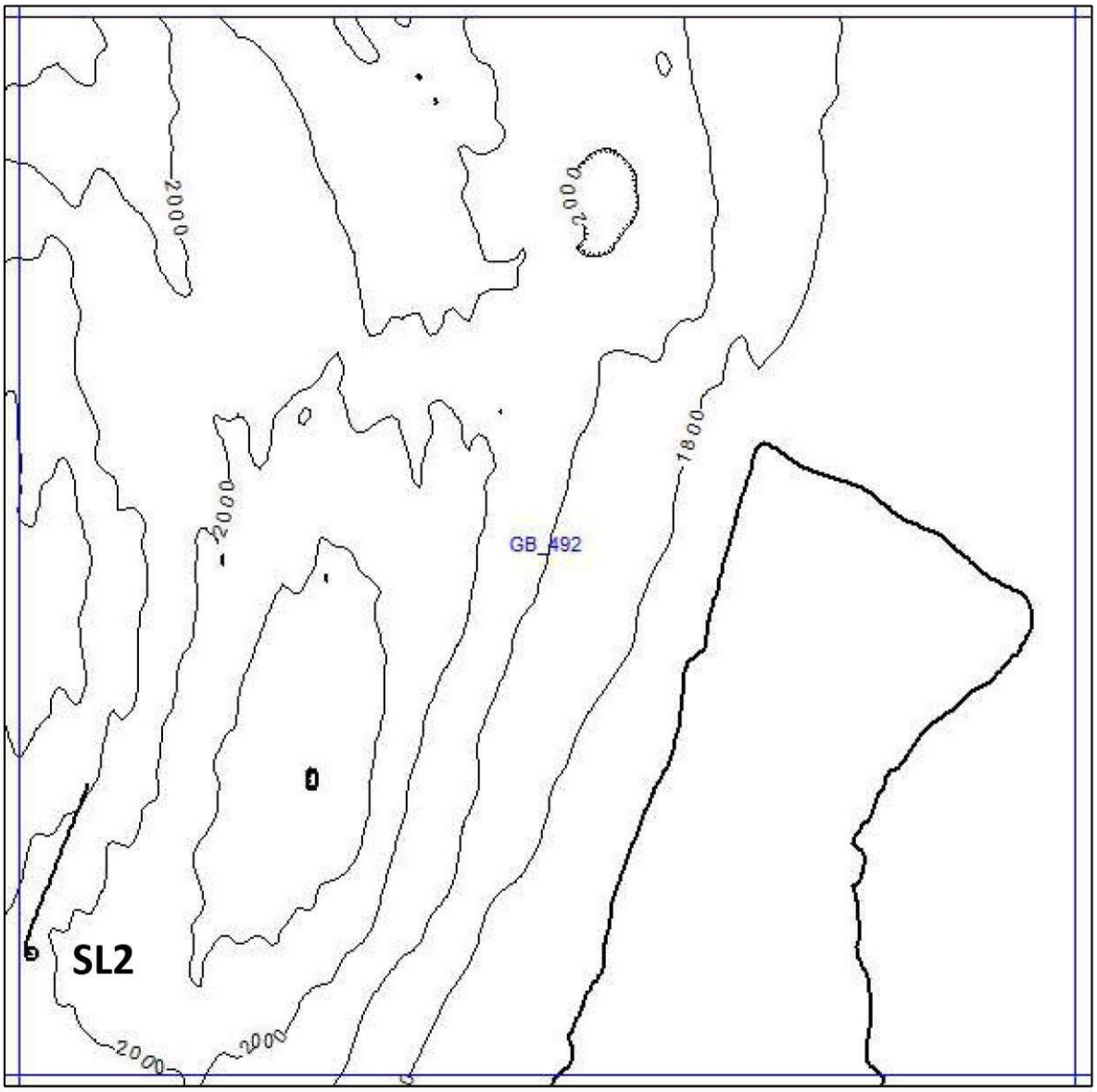
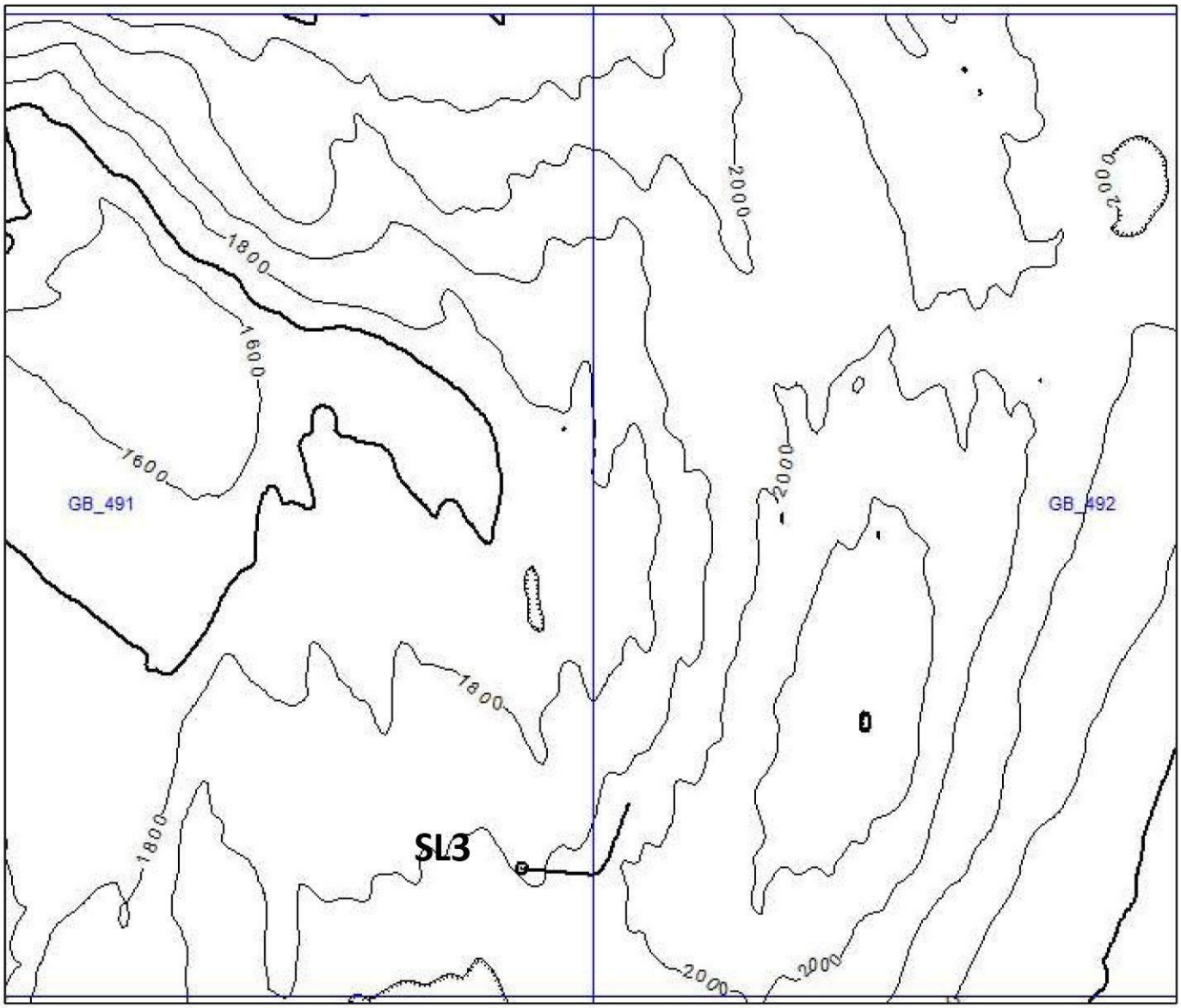
Attachment 1-C



KOSMOS ENERGY GOM OPERATIONS, LLC
GB 492 Bathymetry Map, CI = 100', SL1 Well
Scale = 1:24000 0 2000 4000 6000 ft



KOSMOS ENERGY GOM OPERATIONS, LLC
GB 492 Bathymetry Map, CI = 100', SL2 Well
Scale = 1:24000 0 2000 4000 6000 ft



KOSMOS ENERGY GOM OPERATIONS, LLC
GB 491/492 Bathymetry Map, CI = 100', SL3 Well
Scale = 1:24000 0 2000 4000 6000 ft

Attachment 1-D

Confirmation

Your payment has been submitted to the designated government agency through Pay.gov and the details are below. Please note that this is just a confirmation of transaction submission. To confirm that the payment processed as expected, you may refer to your bank statement on the scheduled payment date. If you have any questions or wish to cancel this payment, you will need to contact the agency you paid at your earliest convenience.

Tracking Information

Pay.gov Tracking ID: 26HQHSBC

Agency Tracking ID: 75760207963

Form Name: BOEM Exploration Plan

Application Name: BOEM Exploration Plan - BF

Payment Information

Payment Type: Bank account (ACH)

Payment Amount: $18,365.00

Transaction Date: 05/30/2019 02:26:16 PM EDT

Payment Date: 05/31/2019

Region: Gulf of Mexico

Contact: Kelley Pisciola 281-698-8519

Company Name/No: Kosmos Energy Gulf of Mexico Operations, LLC, 03362

Lease Number(s): 35918, 35919, , ,

Area-Block: Garden Banks GB, 491: Garden Banks GB, 492: , : , : ,

Surface Locations: 5

Account Information

Account Holder Name: Kosmos Energy Gulf of Mexico Operations, LLC

Routing Number: 111000012

Account Number: **********3517

SECTION 2
GENERAL INFORMATION

2.1 APPLICATIONS AND PERMITS

The table below provides all additional applications to be filed covering operations proposed in this EP.

Application/Permit	Issuing Agency	Status
Application for Permit to Drill	BSEE	To Be Submitted
Application for Permit to Modify	BSEE	To Be Submitted
Emergency Evacuation Plan	USCG	To Be Submitted

2.2 DRILLING FLUIDS

The table below provides the types and estimated volumes of the drilling fluids Kosmos plans to use to drill the proposed wells.

Type of Drilling Fluid	Estimated Volume of Drilling Fluid to be Used per Well (bbl)
Water-based (seawater, freshwater, barite)	35,000
Oil-based (diesel, mineral oil)	N/A
Synthetic-based (internal olefin, ester)	20,000

2.3 NEW OR UNUSUAL TECHNOLOGY

No new or unusual technology is proposed in this EP as defined by 30 CFR 550.200.

2.4 BONDING STATEMENT

The bond requirements for the activities and facilities proposed in this EP are satisfied by a an area-wide bond, furnished and maintained according to 30 CFR 556.900 (a) and 30 CFR 556.901 (a) and (b) and NTL No. 2015-BOEM-N04, "General Financial Assurance"; and additional security under 30 CFR 556.901(d) – (f) and NTL No. 2016—BOEM-N01, “Requiring Additional Security” as required by BOEM.

2.5 OIL SPILL FINANCIAL RESPONSIBILITY (OSFR)

Kosmos Energy Gulf of Mexico Operations, LLC (Company No.03362) has demonstrated oil spill financial responsibility for the facilities proposed in this EP according to 30 CFR 553.15 (a); and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities".

2.6 DEEPWATER WELL CONTROL STATEMENT

Kosmos Energy Gulf of Mexico Operations, LLC (Company No.03362) has the financial capability to drill a relief well and conduct other emergency well control operations.

2.7 BLOWOUT SCENARIO AND WORST CASE DISCHARGE CALCULATIONS

In accordance with the requirements outlined in NTL No. 2015-BOEM-N01, “Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordinator Documents on the OCS for Worst Case Discharge and Blowout

Scenarios," the Worst Case Discharge assumptions and calculations are included as **Attachment 2-A**, and the blowout scenario follows:

BLOWOUT SCENARIO

Estimated maximum flow rate

The estimated maximum flow rate would occur if a kick were taken and the well blew out. The maximum Worst Cast Discharge (WCD) modeled for this scenario is 430,400 BOPD.

Maximum duration of blowout (days)

The duration of the blowout will be a function of the well bridging over, the ability of surface intervention to shut-in or contain the well or, as a last resort, drilling a relief well to kill the blowout. The expected maximum time frames for uncontrolled flow in each of the different operational outcomes would be as follows:

- Bridging over in 2 days
- Surface Intervention in 15 days
- A relief well drilled in 85 days

Maximum discharge volume

The following table is a linear estimate of the maximum discharge volume for each of the aforementioned operational outcomes assuming no reservoir depletion.

Operational Outcome	Maximum Discharge Rate (bbl/day)	Discharge Duration (days)	Maximum Discharge Volume (bbl)
Bridging Over	430,400	2	860,800
Surface Intervention	430,400	15	6,456,000
Relief Well	430,400	85	36,584,000

Potential of wellbore to bridge over during a blowout.

There is potential for the wellbore to bridge over during the WCD blowout. However, there is little internal data to definitively support such an assumption.

Surface intervention to stop blowout

In the event of a blowout and assuming the blowout prevention equipment is still intact, the subsea BOP will be used for successful shut-in of the well. The well would then be killed and re-entered to either abandon or return to normal operations. Surface intervention would be the first line of defense after a blowout occurs. The specific intervention technique chosen will depend on actual conditions and ability to access the existing well.

In the event that the subsea BOP is inoperable, the surface intervention would employ the Helix Well Containment Group (HWCG) containment system to achieve successful containment of the

well. The system will be employed, while simultaneously initiating relief well planning and operations. Specifics will be submitted within the Well Containment Plan.

Typically blowouts can be controlled with surface intervention, with a good likelihood of success and in a relatively short time frame, as long as the subsea casing, wellhead and BOPs are not damaged beyond use. The intervention technique chosen will depend on actual conditions and ability to access the existing well. There can be simple solutions such as rigging up and bullheading kill mud or more complex solutions, but the solution will depend on wellbore conditions.

Surface intervention time estimate

The assumption is that the well has an uncontrolled blowout and the MODU has sunk with displacement from the wellhead. Additionally, it assumes that debris removal will be required to gain access to the subsea BOP system and the ROV has been deployed and was unsuccessful in shutting in the well, using the existing subsea BOP control panel. The scenario employs one of the aforementioned containment system's capping BOPs.

The following table describes the estimated time required to shut in and secure the well using the containment system or capping stack. Note that these operations all basically start at the same point in time and are performed in parallel. The entire operations is estimated to take 15 days from the start of site assessment until the capping stack has been deployed and the well shut in.

Duration of a well capping operation

Operation	Incremental Duration (days)	Cumulative Time Since Event Start (days)
Assess wellbore conditions for surface intervention requirements. Conduct notifications to the regulatory agencies and primary contractors.	2	2
Site preparation which includes mobilizing and deployment of the IWOCS system and Dispersant system.	3	5
Debris removal including mobilization of ROV boat and construction support vessel and execution of debris removal plan.	2	7
Well capping and/or cap and flow operations which include mobilization, deployment, and installation of the well containment system.	8	15

Relief Well

It is preferred to drill relief wells from an open water location rather than a platform location. Open water locations provide the best option on designing a simpler intercept well and allow a greater

choice on rig availability. There are not any platforms in the immediate vicinity; therefore, it is not feasible to consider as a relief well location.

Relief well location and drilling strategy

The surface location for a relief well is a function of seabed bottom and shallow hazards conditions, current, wind direction and wellbore access. The relief well surface location for Well Location SL 3 could be drilled from a cleared-of-hazards surface location SL 4 or SL 5.

A relief well for Well Location SL 3 would be designed to intersect the blowout well below the 11-7/8" casing shoe setting depth. Once the well is intersected, kill pumping operations would be initiated to kill the blowout well.

Relief well rig availability

As of the date of this EP submittal, the rigs listed below could be available for relief well operations in the GOM:

Rig Name	Contractor	Rated Water Depth	MODU Type	Rig Status
Ocean Black Lion	Diamond	12,000	Drillship	Contracted
Ocean Black Rhino	Diamond	12,000	Drillship	Contracted
West Auriga	Seadrill	12,000	Drillship	Contracted
Rig Name	**Contractor**	**Rated Water Depth**	**MODU Type**	**Rig Status**
West Vela	Seadrill	12,000	Drillship	Contracted
Sharav	Pacific	12,000	Drillship	Contracted
Deepwater Asgard	Transocean	12,000	Drillship	Contracted
Ensco 8503	Ensco	8,500	DP Semi	Contracted

Relief well package constraints

The proposed rigs for relief well operations have suitable drilling packages with sufficient capabilities to work in the subject water depths and drill to the required relief well depth. The BOP systems have met the BSEE certification requirements and will be re-inspected in transit, prior to drilling a relief well to the required true vertical depth.

Relief well rig contract and mobilization timing

A suitable rig could be selected and a contract finalized in 48 hours after undertaking the decision to begin relief well operations. Backup tubulars and wellhead systems are maintained in stock for each well. Mobilization of equipment and services to the rig for the relief well could be completed while operations required to suspend the rig's current activity were taking place. The time required to contract, mobilize, drill a relief well and kill the blowout well is estimated at 85 days and is summarized below.

Description	Days	Cumulative Days
Well Control Assessment. Identify suitable MODU for relief well operations.	2	2
MODU suspends operations from current well. Contract to be executed and well spud equipment is mobilized.	14	16
Penetrate to the last casing shoe above the blowout	58	74
Intersect the blowout	7	81
Days to kill the blowout	4	85
RD pumping equipment, PA wellbore, pull Riser, and demobilize.	12	97

Blowout Prevention and Intervention

Duration of a relief well

Kosmos has maintained a safe track record of prudent operations in the GOM deepwater environment. It will continue to implement its safe operating practices to enhance its operating risk reduction program. In addition to the safe operating practices, the following measures will be implemented into well design, drill and completion operations.

- BOP Certification, BOP Drills, Pit Drills and all other required BSEE testing requirements
- Current Well Control Certification for all Drilling and Completion Rig Site Supervisors
- Take Slow Pump Rate measurements during all open hold operations and critical cased hole operations
- Update kill sheets during each tour and post same on the rig floor
- Maintain a current BOP to RKB spaceout chart
- Well Site Supervisor will monitor wellbore fill-ups and displacements during trips
- Maintain the necessary circulating swages, TIW Valves and IBOP on the rig floor at all times during operations and function test these valves during each tour

The utilization of Pre-Job Safety meetings will continue to be implemented prior to each operations with all of the rig crews. These are intended to create a behavior based safety programs and promote an atmosphere within Kosmos and rig crew interface, such that a “Stop the Job” mentality is promoted across the rig contractor’s crew, empowering every crew member to question the safety of each operation.

Early well control intervention

In the event of a blowout situation, due to failed BOP equipment and uncontrolled flow at the seafloor or at surface, assuming all other surface controlled actuation measures have failed or are inaccessible, a ROV will dive into position at the BOP subsea actuation panel and actuate the shear ram or pipe rams to establish containment.

If the riser system and rig have been compromised, then debris removal will be initiated to obtain clear access to the BOP. A Capping Stack will be employed to achieve successful containment of the well. Once containment is established and wellbore pressure testing and assessment is completed by Kosmos and the Well Control Specialist, well kill operations can be initiated through the existing wellbore.

Well control engineering services

Kosmos will have service agreements in place with Wild Well Control and Boots and Coots International Well Control prior to commencement of well operations. In the event of a blowout situation, these companies will be contacted to assist in the detailed design and implementation of well control and/or relief well operations.

Additional prevention & mitigation techniques

Pursuant to wellbore cementing and zonal isolation techniques, all cementing operations will be modeled and designed under the guidelines set forth in API Recommended Practice 65 Parts 1 & 2. Operations will be dictated by the rules and requirements set forth in Federal Regulations, under the wellbore cementing requirements.

API Standard 53 Blowout Prevention Equipment Systems for Drilling Wells and Recommended Practice 16Q for Marine Drilling Risers will be used as the guidelines for installation, testing and maintenance of the surface and subsea Marine Risers and BOP systems. The purpose of these recommended practices is to provide information that can serve as a guide for installation and testing of blowout prevention systems Kosmos has contracted for floating marine drilling rigs.

The goal of using these recommended practices is to assist Kosmos operations in promoting personnel safety, public safety and integrity of the drilling equipment and preservation of the environment for floating marine drilling operations. These recommended practices help to facilitate the broad availability of proven, sound engineering and operating practices.

These practices are considered acceptable for accomplishing BOP and Marine Riser associated operations. However, equivalent alternative installations and practices may be utilized to accomplish the same objectives. When using these recommended practices or other alternatives, Kosmos will ensure that operations comply with requirements of Federal Regulations.

SECTION 3
GEOLOGICAL AND GEOPHYSICAL INFORMATION

3.1 GEOLOGICAL DESCRIPTION
Proprietary Information.

3.2 STRUCTURE CONTOUR MAPS
Proprietary Information.

3.3 INTERPRETED SEISMIC LINES
Proprietary Information.

3.4 GEOLOGICAL STRUCTURE CROSS-SECTIONS
Proprietary Information.

3.5 SHALLOW HAZARDS REPORT
In accordance with NTL No. 2008-G05, "Shallow Hazards Program," a shallow hazards survey evaluating seafloor and subsurface geological and manmade features and conditions that may adversely affect drilling operations, was conducted over Garden Banks Blocks 491 and 492. The shallow hazards report is provided with this plan.

3.6 SHALLOW HAZARDS ASSESSMENT
In accordance with NTL No. 2008-G05, "Shallow Hazards Program," a site-specific shallow hazards assessment has been prepared by Geoscience Earth & Marine Services, Inc. (GEMS) for each of the proposed surface locations evaluating seafloor and subsurface geological and manmade features and conditions that may adversely affect drilling operations. The shallow hazards assessments are included as **Attachment 3-D**.

3.7 HIGH-RESOLUTION SEISMIC LINES
Proprietary Information.

3.8 STRATIGRAPHIC COLUMN
Proprietary Information.

3.9 TIME VERSUS DEPTH TABLES
Proprietary Information.

VOLUME II: SITE CLEARANCE LETTER(S)

Shallow Hazards Assessment, Blocks 491 and 492, Garden Banks Area, Gulf of Mexico	
Volume I Geological Assessment	**Volume II Site Clearance Letter(s)**
Section 1 Regional Geologic Summary	**Proposed Wellsite GB 492 SL1** Block 492 (OCS-G-35919) Garden Banks Area, Gulf of Mexico
Section 2 Bathymetry and Seafloor Conditions	**Proposed Wellsite GB 492 SL2** Block 492 (OCS-G-35919) Garden Banks Area, Gulf of Mexico
Section 3 Subsurface Stratigraphy and Conditions within the Study Area	**Proposed Wellsite GB 491 SL3** Block 491 (OCS-G-35918) Garden Banks Area, Gulf of Mexico
Section 4 Potential Drilling Constraints	**Proposed Wellsite GB 491 SL4** Block 491 (OCS-G-35918) Garden Banks Area, Gulf of Mexico
	Proposed Wellsite GB 492 SL5 Block 492 (OCS-G-35919) Garden Banks Area, Gulf of Mexico

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May 29, 2019

Project No.: 0419-2846

Kosmos Energy
Energy Crossing II
15011 Katy Freeway, Suite 700
Houston, TX 77094

Attention: Mr. Leslie Cundiff

Site Clearance Letter,
Proposed Wellsite GB 492 SL1,
Block 492 (OCS-G-35919),
Garden Banks Area,
Gulf of Mexico

Kosmos Energy (Kosmos) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for the proposed location GB 492 SL1 in Block 492 (OCS-G-35919), Garden Banks Area, Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Top of Salt, a depth of about 2,075 ft below the mudline (bml).

The proposed wellsite is situated along an area of abundant seafloor faulting. There are no potential sites for deepwater benthic communities within 2,000 ft and no sonar targets were identified in the vicinity of the proposed wellsite. Caution is recommended while jetting through the conductor zone (0 to 300 ft) with respect to variable and potentially overconsolidated sediments within shallow mass-transport deposits. There is a negligible to low potential for encountering overpressured sands between the seafloor and the Top of Salt. A high potential for encountering shallow gas exists within high-amplitude reflectors beneath Horizon 40b. Engineers should be aware of the potential for lost circulation across fault planes, two of which will likely be encountered within the conductor zone.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed Exploration Wellsite GB 492 SL1 lies in the southwestern portion of GB 492, near the GB 491 block boundary. Kosmos provided the following coordinates:

Table II-SL1-1. Proposed Location Coordinates

Proposed Wellsite GB 492 SL1			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 15 North		**Line Reference**	**Block Calls (GB 492)**
X: 1,457,385 ft	Latitude: 27° 27′ 35.7909″ N	Inline 9661	105 ft FWL
Y: 9,964,997 ft	Longitude: 93° 33′ 52.5381″ W	Crossline 3657	1,637 ft FSL

Kosmos plans to drill this well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings provided within Volume I of this report. The text, maps, and figures included in the report provide detail on the regional geology of the Study Area. Kosmos provided exploration 3-D seismic time and depth volumes for the geohazard analysis, covering an approximate 60 mi^2 area that includes all or portions of Federal lease Blocks GB 490-493, 534-537, and 580-581. A seafloor assessment was completed over the "Seafloor Mapping Area" encompassing of all, or portions, of Blocks

GB 490-493 and 534-537. Subsurface mapping was limited to a two-block area covering Blocks GB 491 and 492 (Figure II-SL1-1).

Kosmos also provided high-resolution geophysical data collected by Fugro USA Marine, Inc., (Fugro) in May 2018 using an AUV (Autonomous Underwater Vehicle). These data were acquired over the southern three-quarters of the Study Area (Figure II-SL1-1) and included subbottom profiler, side-scan sonar, multibeam bathymetry, and multibeam backscatter data. Fugro completed Shallow Geohazards and Archaeological Assessments of the AUV Survey Area and submitted the report to BP America Inc., in July 2018 (Fugro, 2018). The digital datasets, mapped features, and completed reports were provided to GEMS for integration into this assessment.

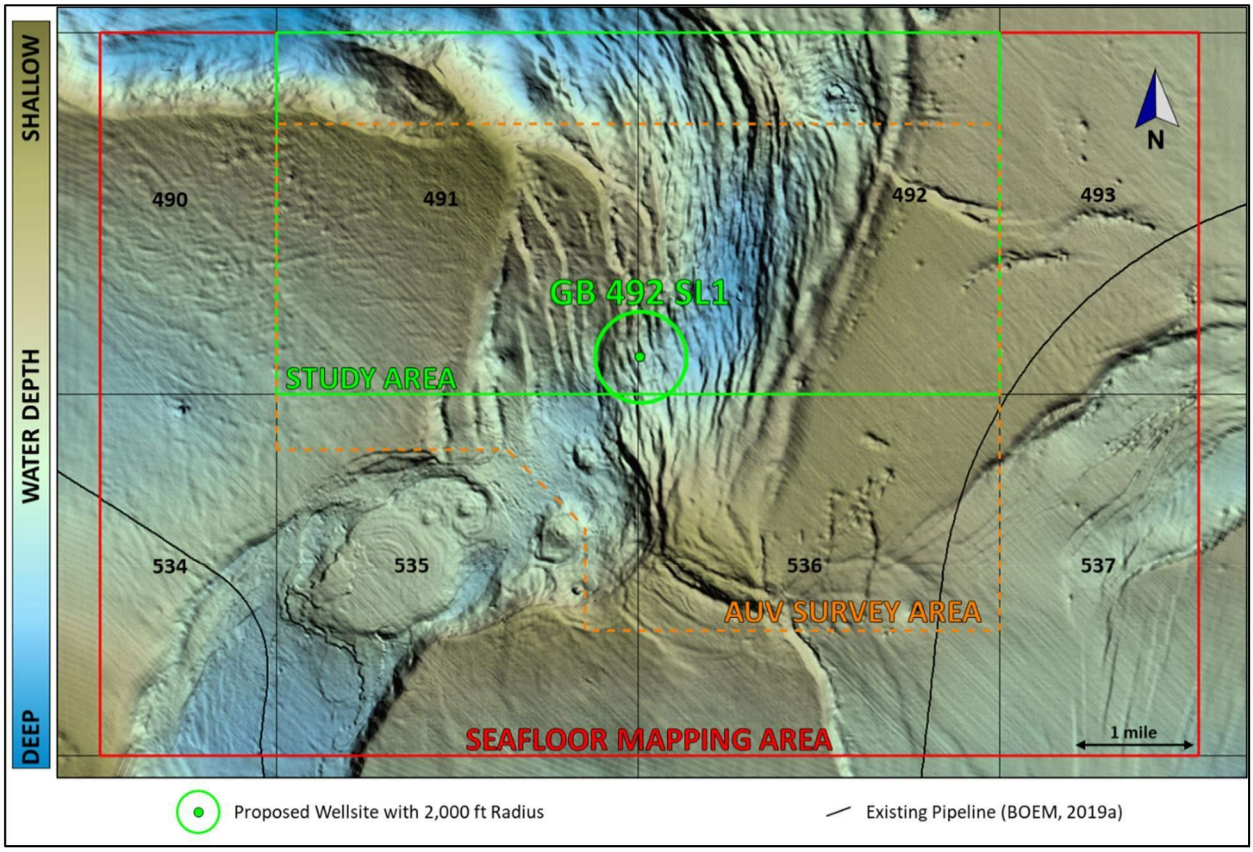

Figure II-SL1-1. Seafloor Rendering surrounding the Garden Banks Study Area

Attachments

Wellsite maps are centered on the Proposed Wellsite GB 492 SL1 and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. GB 492 SL1-1: Bathymetry Map
Map No. GB 492 SL1-2: Gradient Map
Map No. GB 492 SL1-3: Seafloor Features Map
Map No. GB 492 SL1-4: Side-Scan Sonar Mosaic
Map No. GB 492 SL1-5: Seafloor Amplitude Rendering
Map No. GB 492 SL1-6: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration GB 492 SL1-1: Subbottom Profiler Line Showing Near-Surface Conditions Beneath Proposed Wellsite GB 492 SL1

Illustration GB 492 SL1-2: Portions of Inline 9661 and Crossline 3657 Showing Conditions Beneath Proposed Wellsite GB 492 SL1

Illustration GB 492 SL1-3: Tophole Prognosis Chart, Proposed Wellsite GB 492 SL1

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) Notice to Lessees (NTLs) 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) concerning high-density deepwater benthic communities and geohazard assessments. BOEM's NTL 2015-N02 (BOEM, 2015) eliminates the expiration of all NTLs pending further review.

Block GB 492 is not considered to have a high potential for archaeological resources per NTL 2011-JOINT-G01 (BOEM, 2011). However, an archaeological assessment must be completed prior to performing any exploration activities in order to satisfy requirements in BOEMRE's "Pre-Seabed Disturbance Survey Mitigation" (BOEMRE, 2011). Fugro prepared an archaeological assessment to comply with the Archaeological Resource Surveys and Reports requirements in NTL 2005-G07 (MMS, 2005); see Appendix D of the main report.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic data cube provided by Kosmos at the proposed wellsite (Figure II-SL1-2). The extraction was generated within a 2,000-ft radius of the intersection of the inline and crossline at the proposed wellsite. The extraction interval consisted of the seafloor to approximately 3,000 ft below the seafloor. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 12 Hz to 84 Hz.

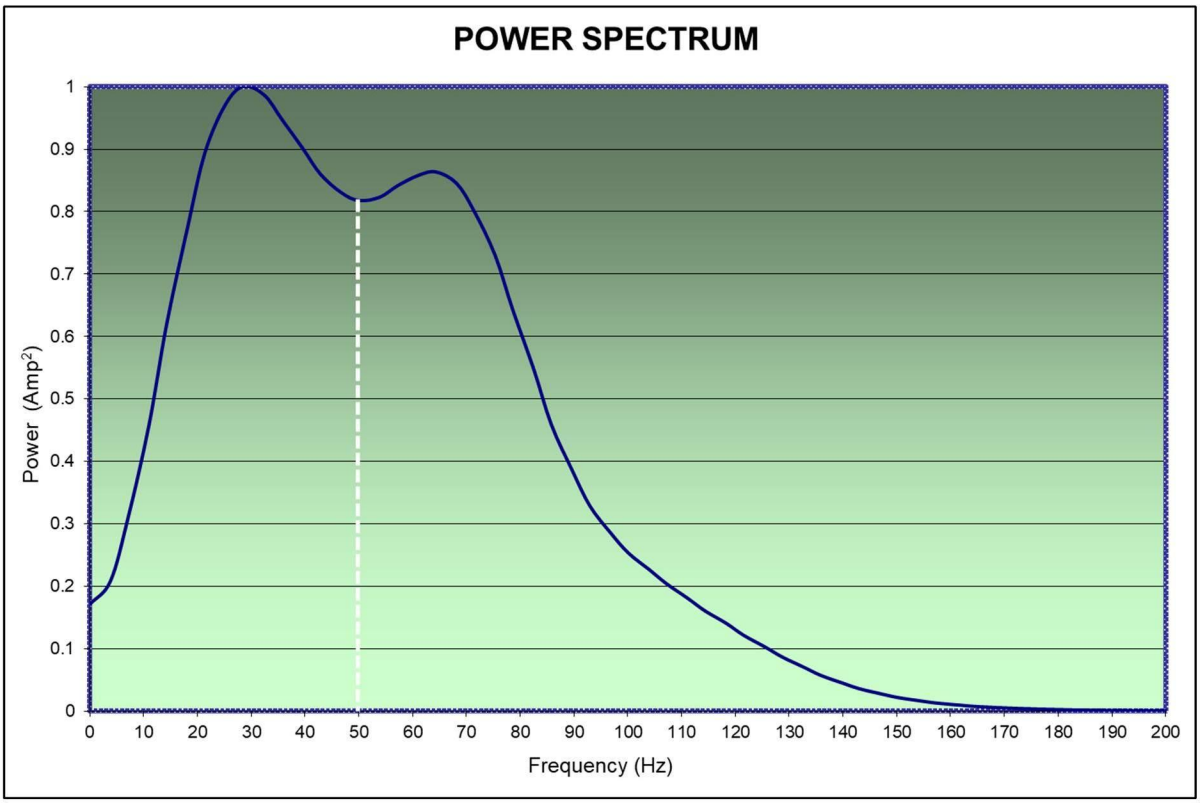

Figure II-SL1-2. Power Spectrum Curve, Proposed Wellsite GB 492 SL1

Man-Made Features

No pipelines, wells, or other man-made infrastructure are reported in the vicinity of Proposed Wellsite GB 492 SL1. No side-scan sonar contacts are located within a 2,000 ft radius of the proposed location. No archaeological avoidances or known shipwrecks exist near the proposed site.

Wellsite Conditions

The proposed location is within an area of abundant seafloor faulting. A mass-transport deposit, with probable variable sediment properties and possible overconsolidated soils, will be encountered within the conductor zone. The following discussions on stratigraphy and lithology are based on seismic character. No existing wells are present in the vicinity to correlate stratigraphy to the proposed wellsite.

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,978 ft (Map GB 492 SL1-1). The seafloor slopes to the southeast at 3.9° (Map GB 492 SL1-2). The GB 492 SL1 location is situated about 130 ft east of a mapped seafloor fault (Map GB 492 SL1-3); however, nearby subbottom profiler data indicates that a consistent hemipelagic drape overlies this fault, indicating it is likely inactive (Illustration GB 492 SL1-1). Seafloor offsets along this fault are up to 25 ft, with gradients reaching 17°. There is a potential for minor shallow sediment slides along the steep slopes; however, the surficial sediments appear stable and any slide would likely produce minimal, local runout. An approximate 15 ft surficial drape of soft, high water content silty clays covers the seafloor at the proposed wellsite (Illustration GB 492 SL1-1).

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that are capable of supporting high-density chemosynthetic or other deepwater benthic communities. The side-scan sonar mosaic and seafloor amplitude rendering indicate a relatively homogenous seabed in the vicinity of the proposed location, suggesting normal Gulf of Mexico surficial sediments (Maps GB 492 SL1-4 and GB 492 SL1-5). Several pockmarks are present within 2,000 ft of the proposed wellsite; however, these are interpreted as inactive and are not conducive to hosting deepwater benthic communities (Fugro, 2018). Areas of increased side-scan sonar reflectivity represent changes of angles of incidence along fault scarps or buried pockmarks and are not indicative of hardgrounds.

Stratigraphy. Stratigraphic conditions are shown on Illustrations GB 492 SL1-1 through GB 492 SL1-3. Within the Study Area, two horizons (10 and 20) were mapped from the subbottom profiler data, whereas four horizons (30, 40a, 40b, and 50) and the Top of Salt were mapped from the 3-D seismic data. Horizons 20, 40a, and 50 were either not mappable or not present in the vicinity of the proposed wellsite.

The uppermost sediments at the proposed wellsite consist of an approximate 15 ft hemipelagic drape of silty-clays overlying stratified clays and silty-clays (Illustration GB 492 SL1-1). Horizon 10 marks the top of a generally fine-grained mass-transport deposit with some possible sands. This deposit will be encountered at a depth of 52 ft below mudline (bml). The base of this deposit is deeper than the penetration of the subbottom profiler data. The remaining sediments between the seafloor and Horizon 30 (292 ft bml) are likely alternating mass-transport deposits and hemipelagic clays and silty-clays (Illustrations GB 492 SL1-2 and GB 492 SL1-3).

The sedimentary section from Horizon 30 to Horizon 40b (292 ft to 1,426 ft bml) consists of low-amplitude, chaotic reflectors interbedded with low-amplitude, semi-continuous to continuous reflectors (Illustrations GB 492 SL1-2 and GB 492 SL1-3). These sediments are likely clay-prone mass-transport deposits interbedded with fine-grained turbidites and hemipelagic clays. The sediments between Horizon 40b and the Top of Salt (1,426 ft to 2,075 ft bml) likely consist of alternating mass-transport deposits and turbidites containing a mixture of clays, silts, and sands; however, this unit has been highly disturbed and faulted by the influx of shallow salt.

Faults. Five faults will be penetrated by the proposed wellsite between the seafloor and the Top of Salt (Illustrations GB 492 SL1-1 through GB 492 SL1-3). The shallowest faults will be encountered within the conductor zone at approximately 125 ft and 263 ft bml. However, it is important to note the fault planes are not clearly defined through the mass-transport deposits due to signal attenuation (Illustration GB 492 SL1-1).

The shallowest fault encountered, at approximately 125 ft bml, is mapped as a seafloor fault; however, the subbottom profiler data suggests it is buried by a surficial drape, indicating it is likely inactive (Illustration

GB 492 SL1-1). The surface expression of this fault is about 130 ft to the west of the proposed wellsite and exhibits seafloor relief of approximately 25 ft. The seafloor fault encountered at approximately 263 ft bml exhibits a clear offset of the seafloor and near-surface sediments and is therefore possibly active. Seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. There is no evidence of fluid or gas accumulation on the subbottom profiler or 3-D seismic data within the shallow subsurface or migrating along the fault planes. Interpretations and inferences are based on the nearest subbottom profiler line (about 85 ft north) to the proposed location. Due to the complex and dense fault network within the area, depth of fault crossing and fault plane orientation may vary at the proposed location. Engineers should be aware of the potential for lost circulation across fault planes.

Three additional seafloor faults will be encountered at depths of approximately 651 ft, 1,053 ft, and 1,725 ft bml. All the faults trend generally north to south and are downthrown to the east. Seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30.

Shallow Gas and Shallow Water Flow. There is a high potential for encountering shallow gas in the sedimentary section just beneath Horizon 40b (Illustration GB 492 SL1-3). The potential for shallow water flow is considered negligible to low.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below the proposed wellsite; however, three anomalies are located within 250 ft (Map GB 492 SL1-6). These anomalies are located 88 ft north, 176 ft west, and 198 ft northwest of the proposed wellsite and are all located just beneath Horizon 40b (Illustration GB 492 SL1-2). Abundant high-amplitude anomalies are located within this stratigraphic section, likely representing accumulations of shallow gas. A high potential for encountering shallow gas is assigned through the high-amplitude reflectors between 1,426 ft and 1,480 ft bml (Illustration GB 492 SL1-3). GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. The remaining sediments between Horizon 40b and the Top of Salt (1,480 ft to 2,075 ft bml) are designated with a low potential for encountering significant shallow gas (Illustration GB 492 SL1-3). There is a negligible potential for shallow gas in the generally fine-grained sediments between the seafloor and Horizon 40b (1,426 ft bml).

Shallow Water Flow. The potential for shallow water flow at this well location is considered negligible to low due to the stratigraphic framework, and the abundant faulting above salt, which likely reduces the potential for continuous overpressures. However, the lack of well control in the region makes an accurate risk assessment difficult. A low potential for shallow water flow is designated within the sand-prone sediments between Horizon 40b and the Top of Salt (1,426 ft to 2,075 ft bml). Sand layers are likely to be encountered; however, continuous overpressures are not expected. A negligible potential for overpressured sands is assessed within the generally fine-grained sediments between the seafloor and Horizon 40b (1,426 ft bml).

Results

No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed location. In addition, no unidentified sonar targets were delineated on the side-scan sonar data in the vicinity of the proposed wellsite.

Generally fine-grained mass-transport deposits, with some possible sands will be encountered within the conductor zone (0 to 300 ft bml). Caution is recommended while jetting through mass-transport deposits with respect to variable and potentially overconsolidated sediments.

Five faults will be encountered between the seafloor and the Top of Salt, two of which will likely be encountered within the conductor zone. The faults will be encountered at depths of approximately 125 ft, 263 ft, 651 ft, 1,053 ft, and 1,725 ft bml. The faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30. Engineers should be aware of the potential for lost circulation across the fault planes.

It is likely that sand layers will be encountered in the shallow section between Horizon 40b and the Top of Salt (1,426 ft to 2,075 ft bml). There is a high potential for encountering shallow gas within the high-amplitude

reflectors between Horizon 40b (1,426 ft bml) and 1,480 ft bml. GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. There is a negligible to low potential for encountering overpressured sands.

Closing

We appreciate the opportunity to be of service to Kosmos Energy and look forward to working with Kosmos on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Chelcy Berkey
Marine Geologist

Daniel Lanier
President

Christopher Madere
Project Manager/Sr. Geoscientist

Attachments (6 Maps and 3 Figures)

Distribution:
Mr. Leslie Cundiff, Kosmos Energy (1 hardcopy)

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May 29, 2019

Project No.: 0419-2846

Kosmos Energy
Energy Crossing II
15011 Katy Freeway, Suite 700
Houston, TX 77094

Attention: Mr. Leslie Cundiff

Site Clearance Letter,
Proposed Wellsite GB 492 SL2,
Block 492 (OCS-G-35919),
Garden Banks Area,
Gulf of Mexico

Kosmos Energy (Kosmos) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for the proposed location GB 492 SL2 in Block 492 (OCS-G-35919), Garden Banks Area, Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Top of Salt, a depth of about 2,082 ft below the mudline (bml).

The proposed wellsite is situated along an area of abundant seafloor faulting. There are no potential sites for deepwater benthic communities within 2,000 ft and no sonar targets were identified in the vicinity of the proposed wellsite. Caution is recommended while jetting through the conductor zone (0 to 300 ft) with respect to variable and potentially overconsolidated sediments within shallow mass-transport deposits. There is a negligible to low potential for encountering overpressured sands between the seafloor and the Top of Salt. A high potential for encountering shallow gas exists within high-amplitude reflectors beneath Horizon 40b. Engineers should be aware of the potential for lost circulation across fault planes, one of which will likely be encountered within the conductor zone.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed Exploration Wellsite GB 492 SL2 lies in the southwestern portion of GB 492, near the GB 491 block boundary. Kosmos provided the following coordinates:

Table II-SL2-1. Proposed Location Coordinates

Proposed Wellsite GB 492 SL2			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 15 North		**Line Reference**	**Block Calls (GB 492)**
X: 1,457,472 ft	Latitude: 27° 27′ 37.2114″ N	Inline 9666	192 ft FWL
Y: 9,965,140 ft	Longitude: 93° 33′ 51.5793″ W	Crossline 3656	1,780 ft FSL

Kosmos plans to drill this well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings provided within Volume I of this report. The text, maps, and figures included in the report provide detail on the regional geology of the Study Area. Kosmos provided exploration 3-D seismic time and depth volumes for the geohazard analysis, covering an approximate 60 mi^2 area that includes all or portions of Federal lease Blocks GB 490-493, 534-537, and 580-581. A seafloor assessment was completed over the "Seafloor Mapping Area" encompassing of all, or portions, of Blocks

GB 490-493 and 534-537. Subsurface mapping was limited to a two-block area covering Blocks GB 491 and 492 (Figure II-SL2-1).

Kosmos also provided high-resolution geophysical data collected by Fugro USA Marine, Inc., (Fugro) in May 2018 using an AUV (Autonomous Underwater Vehicle). These data were acquired over the southern three-quarters of the Study Area (Figure II-SL2-1) and included subbottom profiler, side-scan sonar, multibeam bathymetry, and multibeam backscatter data. Fugro completed Shallow Geohazards and Archaeological Assessments of the AUV Survey Area and submitted the report to BP America Inc., in July 2018 (Fugro, 2018). The digital datasets, mapped features, and completed reports were provided to GEMS for integration into this assessment.

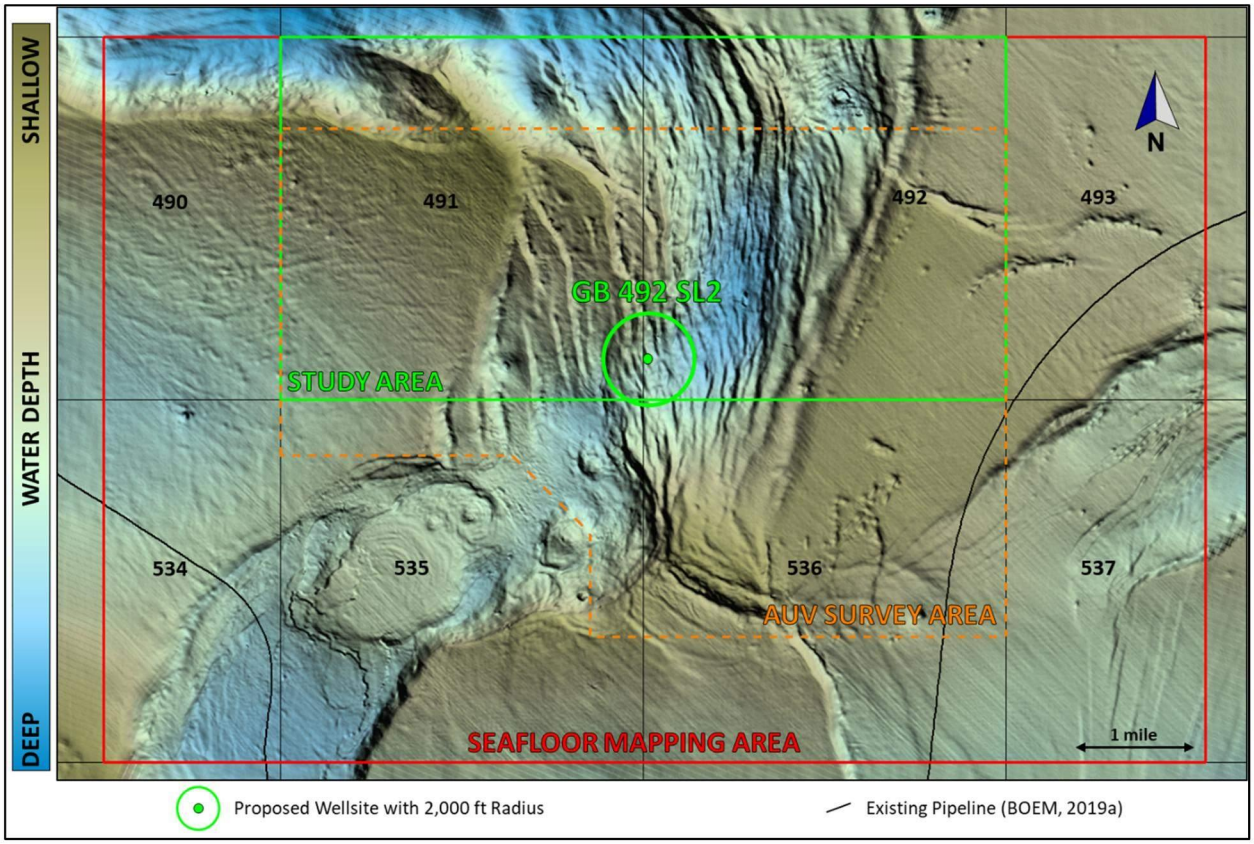

Figure II-SL2-1. Seafloor Rendering surrounding the Garden Banks Study Area

Attachments

Wellsite maps are centered on the Proposed Wellsite GB 492 SL2 and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. GB 492 SL2-1: Bathymetry Map
Map No. GB 492 SL2-2: Gradient Map
Map No. GB 492 SL2-3: Seafloor Features Map
Map No. GB 492 SL2-4: Side-Scan Sonar Mosaic
Map No. GB 492 SL2-5: Seafloor Amplitude Rendering
Map No. GB 492 SL2-6: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration GB 492 SL2-1: Subbottom Profiler Line Showing Near-Surface Conditions Beneath Proposed Wellsite GB 492 SL2

Illustration GB 492 SL2-2: Portions of Inline 9666 and Crossline 3656 Showing Conditions Beneath Proposed Wellsite GB 492 SL2

Illustration GB 492 SL2-3: Tophole Prognosis Chart, Proposed Wellsite GB 492 SL2

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) Notice to Lessees (NTLs) 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) concerning high-density deepwater benthic communities and geohazard assessments. BOEM's NTL 2015-N02 (BOEM, 2015) eliminates the expiration of all NTLs pending further review.

Block GB 492 is not considered to have a high potential for archaeological resources per NTL 2011-JOINT-G01 (BOEM, 2011). However, an archaeological assessment must be completed prior to performing any exploration activities in order to satisfy requirements in BOEMRE's "Pre-Seabed Disturbance Survey Mitigation" (BOEMRE, 2011). Fugro prepared an archaeological assessment to comply with the Archaeological Resource Surveys and Reports requirements in NTL 2005-G07 (MMS, 2005); see Appendix D of the main report.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic data cube provided by Kosmos at the proposed wellsite (Figure II-SL2-2). The extraction was generated within a 2,000-ft radius of the intersection of the inline and crossline at the proposed wellsite. The extraction interval consisted of the seafloor to approximately 3,000 ft below the seafloor. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 12 Hz to 84 Hz.

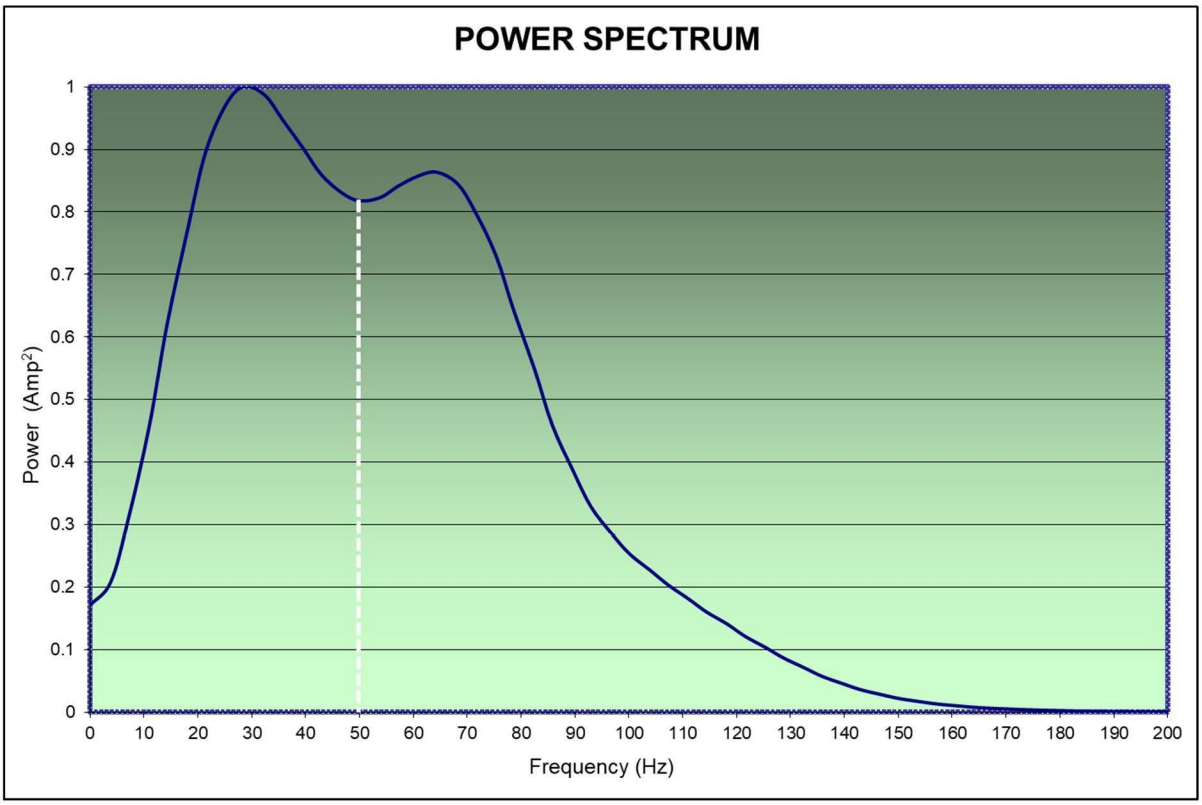

Figure II-SL2-2. Power Spectrum Curve, Proposed Wellsite GB 492 SL2

Man-Made Features

No pipelines, wells, or other man-made infrastructure are reported in the vicinity of Proposed Wellsite GB 492 SL2. No side-scan sonar contacts are located within a 2,000 ft radius of the proposed location. No archaeological avoidances or known shipwrecks exist near the proposed site.

Wellsite Conditions

The proposed location is within an area of abundant seafloor faulting. A mass-transport deposit, with probable variable sediment properties and possible overconsolidated soils, will be encountered within the conductor zone. The following discussions on stratigraphy and lithology are based on seismic character. No existing wells are present in the vicinity to correlate stratigraphy to the proposed wellsite.

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,967 ft (Map GB 492 SL2-1). The seafloor slopes to the south at 5.5° (Map GB 492 SL2-2). The GB 492 SL2 location situated in an area of abundant seafloor faulting. The nearest fault is about 100 ft to the east; however, it is downthrown away from the wellsite (Map GB 492 SL2-3). The wellsite is approximately 265 ft east of a seafloor fault that is downthrown towards the wellsite. Seafloor offsets along this fault are up to 25 ft, with gradients reaching 17°. There is a potential for minor shallow sediment slides along the steep slopes; however, the surficial sediments appear stable and any slide would likely produce minimal, local runout. An approximate 12 ft surficial drape of soft, high water content silty clays covers the seafloor at the proposed wellsite (Illustration GB 492 SL2-1).

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that are capable of supporting high-density chemosynthetic or other deepwater benthic communities. The side-scan sonar mosaic and seafloor amplitude rendering indicate a relatively homogenous seabed in the vicinity of the proposed location, suggesting normal Gulf of Mexico surficial sediments (Maps GB 492 SL2-4 and GB 492 SL2-5). Several pockmarks are present within 2,000 ft of the proposed wellsite; however, these are interpreted as inactive and are not conducive to hosting deepwater benthic communities (Fugro, 2018). Areas of increased side-scan sonar reflectivity represent changes of angles of incidence along fault scarps or buried pockmarks and are not indicative of hardgrounds.

Stratigraphy. Stratigraphic conditions are shown on Illustrations GB 492 SL2-1 through GB 492 SL2-3. Within the Study Area, two horizons (10 and 20) were mapped from the subbottom profiler data, whereas four horizons (30, 40a, 40b, and 50) and the Top of Salt were mapped from the 3-D seismic data. Horizons 20, 40a, and 50 were either not mappable or not present in the vicinity of the proposed wellsite.

The uppermost sediments at the proposed wellsite consist of an approximate 12 ft hemipelagic drape of silty-clays overlying stratified clays and silty-clays (Illustration GB 492 SL2-1). Horizon 10 marks the top of a generally fine-grained mass-transport deposit with some possible sands. This deposit will be encountered at a depth of 70 ft below mudline (bml). The base of this deposit is deeper than the penetration of the subbottom profiler data. The remaining sediments between the seafloor and Horizon 30 (346 ft bml) are likely alternating mass-transport deposits and hemipelagic clays and silty-clays (Illustrations GB 492 SL2-2 and GB 492 SL2-3).

The sedimentary section from Horizon 30 to Horizon 40b (346 ft to 1,444 ft bml) consists of low-amplitude, chaotic reflectors interbedded with low-amplitude, semi-continuous to continuous reflectors (Illustrations GB 492 SL2-2 and GB 492 SL2-3). These sediments are likely clay-prone mass-transport deposits interbedded with fine-grained turbidites and hemipelagic clays. The sediments between Horizon 40b and the Top of Salt (1,444 ft to 2,082 ft bml) likely consist of alternating mass-transport deposits and turbidites containing a mixture of clays, silts, and sands; however, this unit has been highly disturbed and faulted by the influx of shallow salt.

Faults. Five faults will be penetrated by the proposed wellsite between the seafloor and the Top of Salt (Illustrations GB 492 SL2-1 through GB 492 SL2-3). The shallowest fault will be encountered within the conductor zone at approximately 222 ft bml. However, it is important to note the fault planes are not clearly defined through the mass-transport deposits due to signal attenuation (Illustration GB 492 SL2-1).

The shallowest fault encountered, at approximately 222 ft bml, is mapped as a seafloor fault; however, the subbottom profiler data suggests it is buried by a surficial drape, indicating it is likely inactive (Illustration GB 492 SL2-1). The surface expression of this fault is about 265 ft to the west of the proposed wellsite and exhibits seafloor relief of approximately 25 ft. There is no evidence of fluid or gas accumulation on the subbottom profiler or 3-D seismic data within the shallow subsurface or migrating along the fault plane. Interpretations and inferences are based on the nearest subbottom profiler line (about 60 ft south) to the proposed location. Due to the complex and dense fault network within the area, depth of fault crossing and fault plane orientation may vary at the proposed location. Engineers should be aware of the potential for lost circulation across fault planes.

Four additional faults will be encountered beneath the conductor zone. Seafloor faults will be encountered at depths of approximately 436 ft, 688 ft, and 1,810 ft bml. An apparent buried fault will be encountered at 1,350 ft bml. All the faults trend generally north to south and are downthrown to the east. Seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30.

Shallow Gas and Shallow Water Flow. There is a high potential for encountering shallow gas in the sedimentary section just beneath Horizon 40b (Illustration GB 492 SL2-3). The potential for shallow water flow is considered negligible to low.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below the proposed wellsite; however, one anomaly is located within 250 ft (Map GB 492 SL2-6). The small mapped anomaly is located 94 ft west-southwest of the proposed wellsite and is located just beneath Horizon 40b (Illustration GB 492 SL2-2). Abundant high-amplitude anomalies are located within this stratigraphic section, likely representing accumulations of shallow gas. A high potential for encountering shallow gas is assigned through the high-amplitude reflectors between 1,444 ft and 1,505 ft bml (Illustration GB 492 SL2-3). GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. The remaining sediments between Horizon 40b and the Top of Salt (1,505 ft to 2,082 ft bml) are designated with a low potential for encountering significant shallow gas (Illustration GB 492 SL2-3). There is a negligible potential for shallow gas in the generally fine-grained sediments between the seafloor and Horizon 40b (1,444 ft bml).

Shallow Water Flow. The potential for shallow water flow at this well location is considered negligible to low due to the stratigraphic framework, and the abundant faulting above salt, which likely reduces the potential for continuous overpressures. However, the lack of well control in the region makes an accurate risk assessment difficult. A low potential for shallow water flow is designated within the sand-prone sediments between Horizon 40b and the Top of Salt (1,444 ft to 2,082 ft bml). Sand layers are likely to be encountered; however, continuous overpressures are not expected. A negligible potential for overpressured sands is assessed within the generally fine-grained sediments between the seafloor and Horizon 40b (1,444 ft bml).

Results

No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed location. In addition, no unidentified sonar targets were delineated on the side-scan sonar data in the vicinity of the proposed wellsite.

Generally fine-grained mass-transport deposits, with some possible sands will be encountered within the conductor zone (0 to 300 ft bml). Caution is recommended while jetting through mass-transport deposits with respect to variable and potentially overconsolidated sediments.

Five faults will be encountered between the seafloor and the Top of Salt, one of which will likely be encountered within the conductor zone. The faults will be encountered at depths of approximately 222 ft, 436 ft, 688 ft, 1,350 ft, and 1,810 ft bml. The seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30. Engineers should be aware of the potential for lost circulation across the fault planes.

It is likely that sand layers will be encountered in the shallow section between Horizon 40b and the Top of Salt (1,444 ft to 2,082 ft bml). There is a high potential for encountering shallow gas within the high-amplitude reflectors between Horizon 40b (1,444 ft bml) and 1,505 ft bml. GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. There is a negligible to low potential for encountering overpressured sands.

Closing

We appreciate the opportunity to be of service to Kosmos Energy and look forward to working with Kosmos on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Chelcy Berkey
Marine Geologist

Daniel Lanier
President

Christopher Madere
Project Manager/Sr. Geoscientist

Attachments (6 Maps and 3 Figures)

Distribution:
Mr. Leslie Cundiff, Kosmos Energy (1 hardcopy)

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May 29, 2019

Project No.: 0419-2846

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Energy Crossing II
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Houston, TX 77094

Attention: Mr. Leslie Cundiff

Site Clearance Letter,
Proposed Wellsite GB 491 SL3,
Block 491 (OCS-G-35918),
Garden Banks Area,
Gulf of Mexico

Kosmos Energy (Kosmos) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for the proposed location GB 491 SL3 in Block 491 (OCS-G-35918), Garden Banks Area, Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Top of Salt, a depth of about 2,375 ft below the mudline (bml).

The proposed wellsite is situated along an area of abundant seafloor faulting. There are no potential sites for deepwater benthic communities within 2,000 ft and no sonar targets were identified in the vicinity of the proposed wellsite. Caution is recommended while jetting through the conductor zone (0 to 300 ft) with respect to variable and potentially overconsolidated sediments within shallow mass-transport deposits. There is a negligible to low potential for encountering overpressured sands between the seafloor and the Top of Salt. A high potential for encountering shallow gas exists within high-amplitude reflectors beneath Horizon 40b. Engineers should be aware of the potential for lost circulation across fault planes, one of which will likely be encountered within the conductor zone.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed Exploration Wellsite GB 491 SL3 lies in the southeastern corner of GB 491. Kosmos provided the following coordinates:

Table II-SL3-1. Proposed Location Coordinates

Proposed Wellsite GB 491 SL3			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 15 North		Line Reference	Block Calls (GB 491)
X: 1,456,155 ft	Latitude: 27° 27′ 39.6483″ N	Inline 9643	1,125 ft FEL
Y: 9,965,392 ft	Longitude: 93° 34′ 06.2166″ W	Crossline 3629	2,032 ft FSL

Kosmos plans to drill this well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings provided within Volume I of this report. The text, maps, and figures included in the report provide detail on the regional geology of the Study Area. Kosmos provided exploration 3-D seismic time and depth volumes for the geohazard analysis, covering an approximate 60 mi^2 area that includes all or portions of Federal lease Blocks GB 490-493, 534-537, and 580-581. A seafloor assessment was completed over the "Seafloor Mapping Area" encompassing of all, or portions, of Blocks

GB 490-493 and 534-537. Subsurface mapping was limited to a two-block area covering Blocks GB 491 and 492 (Figure II-SL3-1).

Kosmos also provided high-resolution geophysical data collected by Fugro USA Marine, Inc., (Fugro) in May 2018 using an AUV (Autonomous Underwater Vehicle). These data were acquired over the southern three-quarters of the Study Area (Figure II-SL3-1) and included subbottom profiler, side-scan sonar, multibeam bathymetry, and multibeam backscatter data. Fugro completed Shallow Geohazards and Archaeological Assessments of the AUV Survey Area and submitted the report to BP America Inc., in July 2018 (Fugro, 2018). The digital datasets, mapped features, and completed reports were provided to GEMS for integration into this assessment.

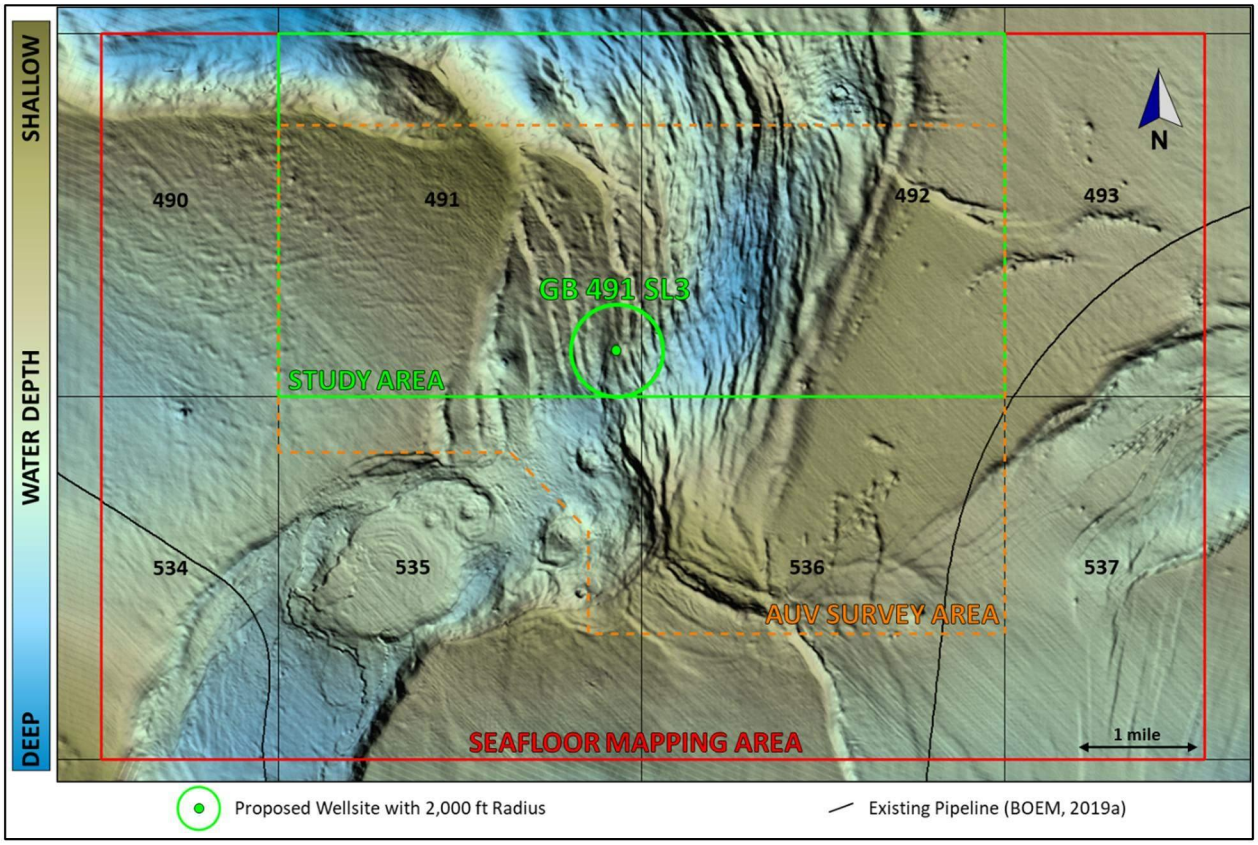

Figure II-SL3-1. Seafloor Rendering surrounding the Garden Banks Study Area

Attachments

Wellsite maps are centered on the Proposed Wellsite GB 491 SL3 and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. GB 491 SL3-1: Bathymetry Map
Map No. GB 491 SL3-2: Gradient Map
Map No. GB 491 SL3-3: Seafloor Features Map
Map No. GB 491 SL3-4: Side-Scan Sonar Mosaic
Map No. GB 491 SL3-5: Seafloor Amplitude Rendering
Map No. GB 491 SL3-6: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration GB 491 SL3-1: Subbottom Profiler Line Showing Near-Surface Conditions Beneath Proposed Wellsite GB 491 SL3

Illustration GB 491 SL3-2: Portions of Inline 9643 and Crossline 3629 Showing Conditions Beneath Proposed Wellsite GB 491 SL3

Illustration GB 491 SL3-3: Tophole Prognosis Chart, Proposed Wellsite GB 491 SL3

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) Notice to Lessees (NTLs) 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) concerning high-density deepwater benthic communities and geohazard assessments. BOEM's NTL 2015-N02 (BOEM, 2015) eliminates the expiration of all NTLs pending further review.

Block GB 491 is not considered to have a high potential for archaeological resources per NTL 2011-JOINT-G01 (BOEM, 2011). However, an archaeological assessment must be completed prior to performing any exploration activities in order to satisfy requirements in BOEMRE's "Pre-Seabed Disturbance Survey Mitigation" (BOEMRE, 2011). Fugro prepared an archaeological assessment to comply with the Archaeological Resource Surveys and Reports requirements in NTL 2005-G07 (MMS, 2005); see Appendix D of the main report.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic data cube provided by Kosmos at the proposed wellsite (Figure II-SL3-2). The extraction was generated within a 2,000-ft radius of the intersection of the inline and crossline at the proposed wellsite. The extraction interval consisted of the seafloor to approximately 3,000 ft below the seafloor. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 14 Hz to 82 Hz.

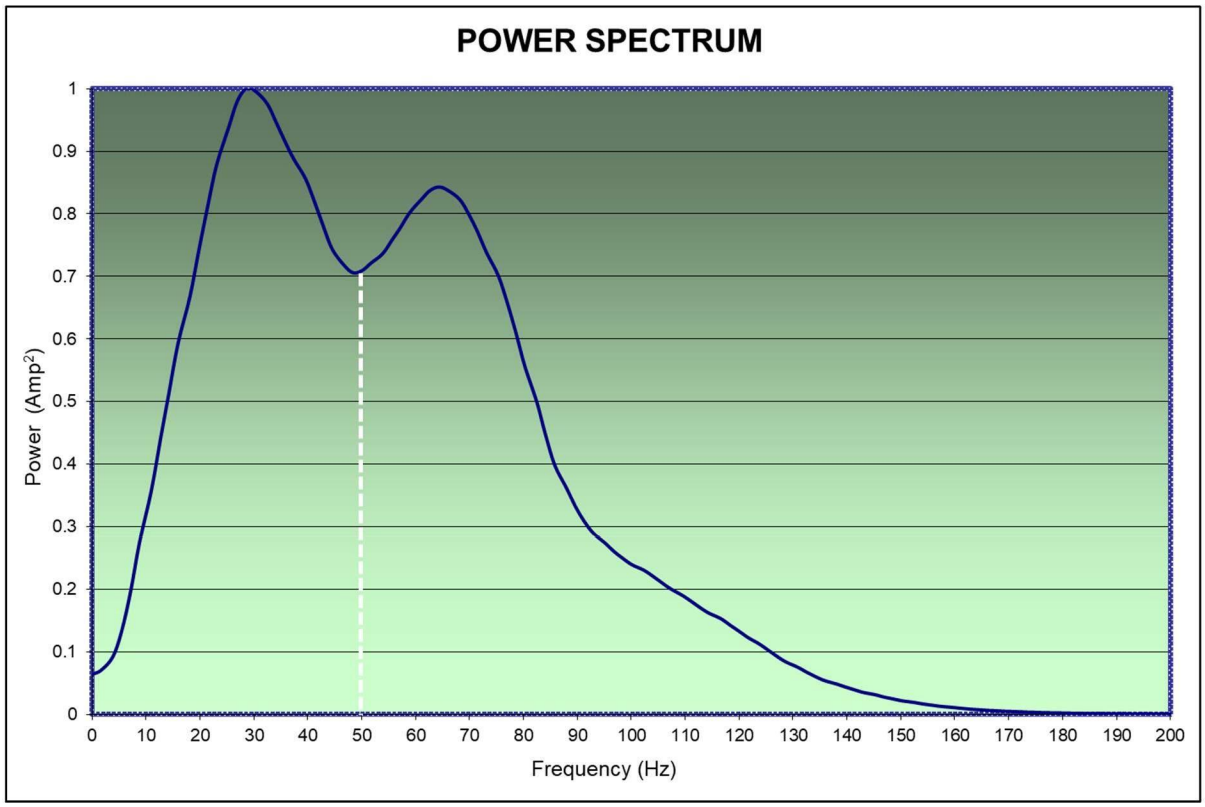

Figure II-SL3-2. Power Spectrum Curve, Proposed Wellsite GB 491 SL3

Man-Made Features

No pipelines, wells, or other man-made infrastructure are reported in the vicinity of Proposed Wellsite GB 491 SL3. No side-scan sonar contacts are located within a 2,000 ft radius of the proposed location. No archaeological avoidances or known shipwrecks exist near the proposed site.

Wellsite Conditions

The proposed location is within an area of abundant seafloor faulting. A mass-transport deposit, with probable variable sediment properties and possible overconsolidated soils, will be encountered within the conductor zone. The following discussions on stratigraphy and lithology are based on seismic character. No existing wells are present in the vicinity to correlate stratigraphy to the proposed wellsite.

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,894 ft (Map GB 491 SL3-1). The seafloor slopes to the southwest at 3.7° (Map GB 491 SL3-2). The GB 491 SL3 location situated in an area of abundant seafloor faulting. The nearest mapped seafloor faults are approximately 120 ft and 195 ft to the east; however, both are downthrown away from the wellsite (Map GB 491 SL3-3). The nearest mapped fault is not evident from the subbottom profiler within the vicinity of the wellsite. An approximate 12 ft surficial drape of soft, high water content silty clays covers the seafloor at the proposed wellsite (Illustration GB 491 SL3-1).

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that are capable of supporting high-density chemosynthetic or other deepwater benthic communities. The side-scan sonar mosaic and seafloor amplitude rendering indicate a relatively homogenous seabed in the vicinity of the proposed location, suggesting normal Gulf of Mexico surficial sediments (Maps GB 491 SL3-4 and GB 491 SL3-5). Several pockmarks are present within 2,000 ft of the proposed wellsite; however, these are interpreted as inactive and are not conducive to hosting deepwater benthic communities (Fugro, 2018). Areas of increased side-scan sonar reflectivity represent changes of angles of incidence along fault scarps or buried pockmarks and are not indicative of hardgrounds.

Stratigraphy. Stratigraphic conditions are shown on Illustrations GB 491 SL3-1 through GB 491 SL3-3. Within the Study Area, two horizons (10 and 20) were mapped from the subbottom profiler data, whereas four horizons (30, 40a, 40b, and 50) and the Top of Salt were mapped from the 3-D seismic data. Horizons 20, 40a, and 50 were either not mappable or not present in the vicinity of the proposed wellsite.

The uppermost sediments at the proposed wellsite consist of an approximate 12 ft hemipelagic drape of silty-clays overlying stratified clays and silty-clays (Illustration GB 491 SL3-1). Horizon 10 marks the top of a generally fine-grained mass-transport deposit with some possible sands. This deposit will be encountered at a depth of 78 ft below mudline (bml). The base of this deposit is deeper than the penetration of the subbottom profiler data. The remaining sediments between the seafloor and Horizon 30 (335 ft bml) are likely alternating mass-transport deposits and hemipelagic clays and silty-clays (Illustrations GB 491 SL3-2 and GB 491 SL3-3).

The sedimentary section from Horizon 30 to Horizon 40b (335 ft to 1,458 ft bml) consists of low-amplitude, chaotic reflectors interbedded with low-amplitude, semi-continuous to continuous reflectors (Illustrations GB 491 SL3-2 and GB 491 SL3-3). These sediments are likely clay-prone mass-transport deposits interbedded with fine-grained turbidites and hemipelagic clays. The sediments between Horizon 40b and the Top of Salt (1,458 ft to 2,375 ft bml) likely consist of alternating mass-transport deposits and turbidites containing a mixture of clays, silts, and sands; however, this unit has been highly disturbed and faulted by the influx of shallow salt.

Faults. Five faults will be penetrated by the proposed wellsite between the seafloor and the Top of Salt (Illustrations GB 491 SL3-1 through GB 491 SL3-3). The shallowest fault will be encountered within the conductor zone at approximately 147 ft bml. However, it is important to note the fault plane is not clearly defined through the mass-transport deposits due to signal attenuation (Illustration GB 491 SL3-1). This fault is buried by a hemipelagic drape, indicating it is no longer active, and is not evident on the 3-D seismic data. Interpretations and inferences are based on the nearest subbottom profiler line (about 180 ft north) to the proposed location. Due to the complex and dense fault network within the area, depth of fault crossing and

fault plane orientation may vary at the proposed location. Engineers should be aware of the potential for lost circulation across fault planes.

Four additional faults will be encountered beneath the conductor zone. Seafloor faults will be encountered at depths of approximately 534 ft and 1,458 ft bml. Apparent buried faults will be encountered at 1,034 ft and 2,121 ft bml. All the faults trend generally north to south and are downthrown to the east. Seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30.

Shallow Gas and Shallow Water Flow. There is a high potential for encountering shallow gas in the sedimentary section just beneath Horizon 40b (Illustration GB 491 SL3-3). The potential for shallow water flow is considered negligible to low.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below the proposed wellsite; however, five anomalies are located within 250 ft (Map GB 491 SL3-6). The nearest mapped anomaly is located 101 ft northwest of the proposed wellsite and the remaining anomalies are between 130 ft and 245 ft to the south, southwest, and northeast. All of the nearby anomalies are located just beneath Horizon 40b (Illustration GB 491 SL3-2). Abundant high-amplitude anomalies are located within this stratigraphic section, likely representing accumulations of shallow gas. A high potential for encountering shallow gas is assigned through the high-amplitude reflectors between 1,458 ft and 1,596 ft bml (Illustration GB 491 SL3-3). GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. The remaining sediments between Horizon 40b and the Top of Salt (1,596 ft to 2,375 ft bml) are designated with a low potential for encountering significant shallow gas (Illustration GB 491 SL3-3). There is a negligible potential for shallow gas in the generally fine-grained sediments between the seafloor and Horizon 40b (1,458 ft bml).

Shallow Water Flow. The potential for shallow water flow at this well location is considered negligible to low due to the stratigraphic framework, and the abundant faulting above salt, which likely reduces the potential for continuous overpressures. However, the lack of well control in the region makes an accurate risk assessment difficult. A low potential for shallow water flow is designated within the sand-prone sediments between Horizon 40b and the Top of Salt (1,458 ft to 2,375 ft bml). Sand layers are likely to be encountered; however, continuous overpressures are not expected. A negligible potential for overpressured sands is assessed within the generally fine-grained sediments between the seafloor and Horizon 40b (1,458 ft bml).

Results

No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed location. In addition, no unidentified sonar targets were delineated on the side-scan sonar data in the vicinity of the proposed wellsite.

Generally fine-grained mass-transport deposits, with some possible sands will be encountered within the conductor zone (0 to 300 ft bml). Caution is recommended while jetting through mass-transport deposits with respect to variable and potentially overconsolidated sediments.

Five faults will be encountered between the seafloor and the Top of Salt, one of which will likely be encountered within the conductor zone. The faults will be encountered at depths of approximately 147 ft, 534 ft, 1,034 ft, 1,458 ft, and 2,121 ft bml. The seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30. Engineers should be aware of the potential for lost circulation across the fault planes.

It is likely that sand layers will be encountered in the shallow section between Horizon 40b and the Top of Salt (1,458 ft to 2,375 ft bml). There is a high potential for encountering shallow gas within the high-amplitude reflectors between Horizon 40b (1,458 ft bml) and 1,596 ft bml. GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. There is a negligible to low potential for encountering overpressured sands.

Closing

We appreciate the opportunity to be of service to Kosmos Energy and look forward to working with Kosmos on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Chelcy Berkey
Marine Geologist

Daniel Lanier
President

Christopher Madere
Project Manager/Sr. Geoscientist

Attachments (6 Maps and 3 Figures)

Distribution:
Mr. Leslie Cundiff, Kosmos Energy (1 hardcopy)

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May 29, 2019

Project No.: 0419-2846

Kosmos Energy
Energy Crossing II
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Houston, TX 77094

Attention: Mr. Leslie Cundiff

Site Clearance Letter,
Proposed Wellsite GB 491 SL4,
Block 491 (OCS-G-35918),
Garden Banks Area,
Gulf of Mexico

Kosmos Energy (Kosmos) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for the proposed location GB 491 SL4 in Block 491 (OCS-G-35918), Garden Banks Area, Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Top of Salt, a depth of about 2,969 ft below the mudline (bml).

The proposed wellsite is situated along an area of abundant seafloor faulting. There are no potential sites for deepwater benthic communities within 2,000 ft and no sonar targets were identified in the vicinity of the proposed wellsite. Caution is recommended while jetting through the conductor zone (0 to 300 ft) with respect to variable and potentially overconsolidated sediments within shallow mass-transport deposits. There is a negligible to low potential for encountering overpressured sands between the seafloor and the Top of Salt. A high potential for encountering shallow gas exists within high-amplitude reflectors beneath Horizon 40b. Engineers should be aware of the potential for lost circulation across fault planes.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed Exploration Wellsite GB 491 SL4 lies in the southeastern quadrant of GB 491. Kosmos provided the following coordinates:

Table II-SL4-1. Proposed Location Coordinates

Proposed Wellsite GB 491 SL4			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 15 North		Line Reference	Block Calls (GB 491)
X: 1,454,711 ft	Latitude: 27° 27′ 48.3595″ N	Inline 9631	2,569 ft FEL
Y: 9,966,278 ft	Longitude: 93° 34′ 22.2969″ W	Crossline 3589	2,918 ft FSL

Kosmos plans to drill this well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings provided within Volume I of this report. The text, maps, and figures included in the report provide detail on the regional geology of the Study Area. Kosmos provided exploration 3-D seismic time and depth volumes for the geohazard analysis, covering an approximate 60 mi^2 area that includes all or portions of Federal lease Blocks GB 490-493, 534-537, and 580-581. A seafloor assessment was completed over the "Seafloor Mapping Area" encompassing of all, or portions, of Blocks

GB 490-493 and 534-537. Subsurface mapping was limited to a two-block area covering Blocks GB 491 and 492 (Figure II-SL4-1).

Kosmos also provided high-resolution geophysical data collected by Fugro USA Marine, Inc., (Fugro) in May 2018 using an AUV (Autonomous Underwater Vehicle). These data were acquired over the southern three-quarters of the Study Area (Figure II-SL4-1) and included subbottom profiler, side-scan sonar, multibeam bathymetry, and multibeam backscatter data. Fugro completed Shallow Geohazards and Archaeological Assessments of the AUV Survey Area and submitted the report to BP America Inc., in July 2018 (Fugro, 2018). The digital datasets, mapped features, and completed reports were provided to GEMS for integration into this assessment.

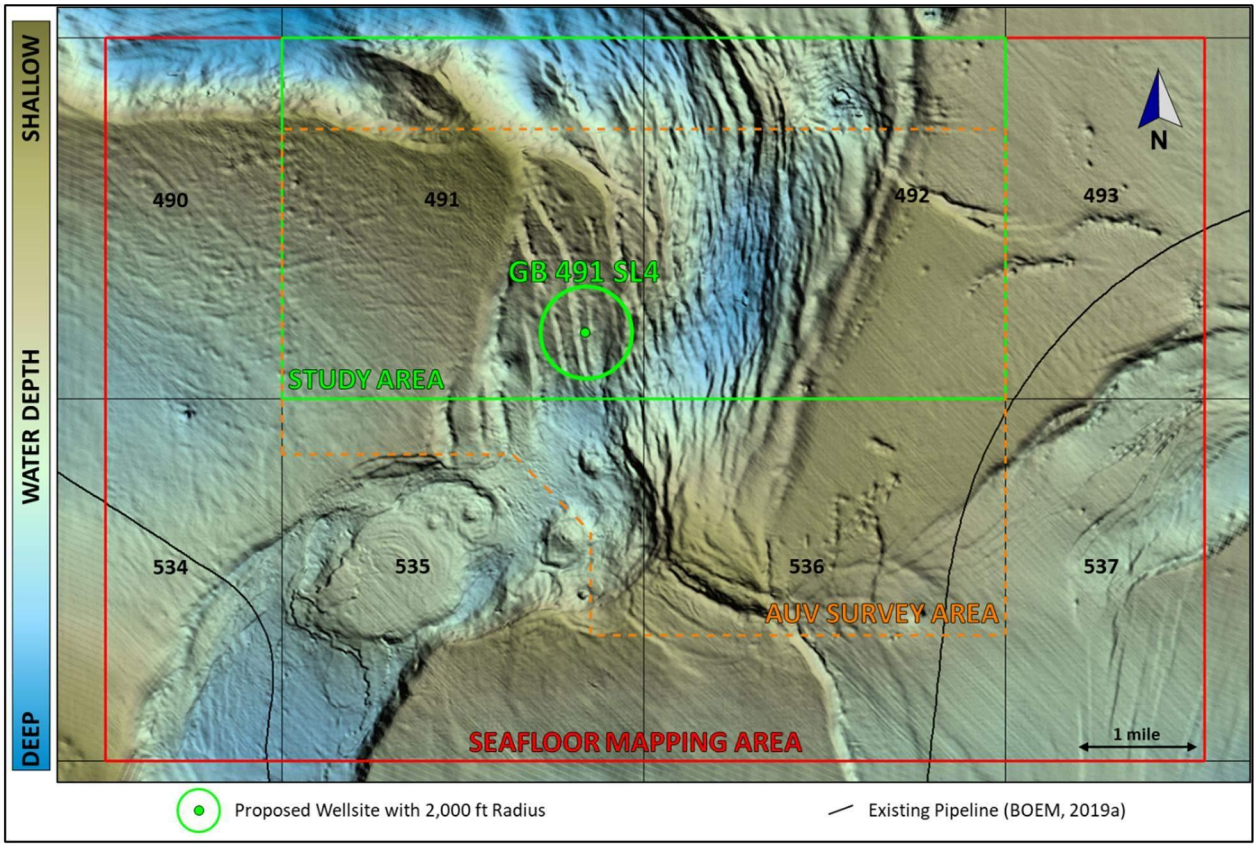

Figure II-SL4-1. Seafloor Rendering surrounding the Garden Banks Study Area

Attachments

Wellsite maps are centered on the Proposed Wellsite GB 491 SL4 and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. GB 491 SL4-1: Bathymetry Map
Map No. GB 491 SL4-2: Gradient Map
Map No. GB 491 SL4-3: Seafloor Features Map
Map No. GB 491 SL4-4: Side-Scan Sonar Mosaic
Map No. GB 491 SL4-5: Seafloor Amplitude Rendering
Map No. GB 491 SL4-6: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration GB 491 SL4-1: Subbottom Profiler Line Showing Near-Surface Conditions Beneath Proposed Wellsite GB 491 SL4

Illustration GB 491 SL4-2: Portions of Inline 9631 and Crossline 3589 Showing Conditions Beneath Proposed Wellsite GB 491 SL4

Illustration GB 491 SL4-3: Tophole Prognosis Chart, Proposed Wellsite GB 491 SL4

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) Notice to Lessees (NTLs) 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) concerning high-density deepwater benthic communities and geohazard assessments. BOEM's NTL 2015-N02 (BOEM, 2015) eliminates the expiration of all NTLs pending further review.

Block GB 491 is not considered to have a high potential for archaeological resources per NTL 2011-JOINT-G01 (BOEM, 2011). However, an archaeological assessment must be completed prior to performing any exploration activities in order to satisfy requirements in BOEMRE's "Pre-Seabed Disturbance Survey Mitigation" (BOEMRE, 2011). Fugro prepared an archaeological assessment to comply with the Archaeological Resource Surveys and Reports requirements in NTL 2005-G07 (MMS, 2005); see Appendix D of the main report.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic data cube provided by Kosmos at the proposed wellsite (Figure II-SL4-2). The extraction was generated within a 2,000-ft radius of the intersection of the inline and crossline at the proposed wellsite. The extraction interval consisted of the seafloor to approximately 3,000 ft below the seafloor. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 15 Hz to 84 Hz.

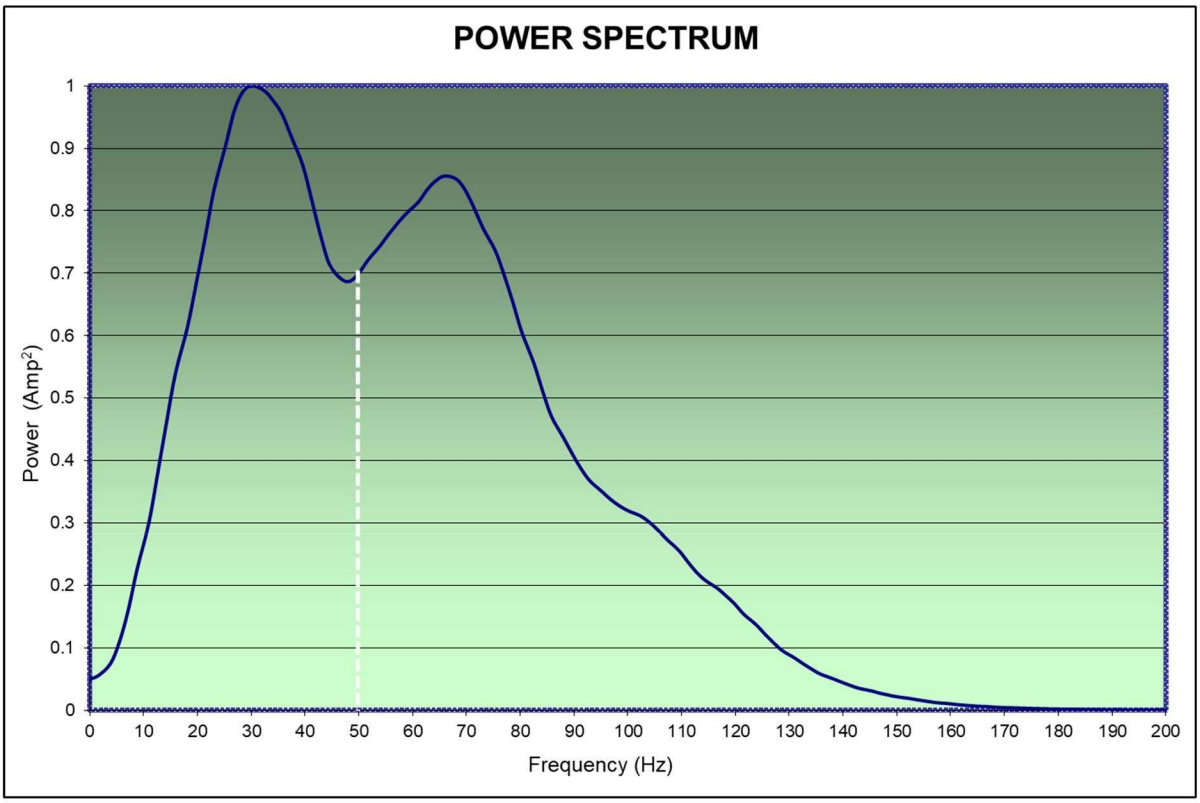

Figure II-SL4-2. Power Spectrum Curve, Proposed Wellsite GB 491 SL4

Man-Made Features

No pipelines, wells, or other man-made infrastructure are reported in the vicinity of Proposed Wellsite GB 491 SL4. No side-scan sonar contacts are located within a 2,000 ft radius of the proposed location. No archaeological avoidances or known shipwrecks exist near the proposed site.

Wellsite Conditions

The proposed location is within an area of abundant seafloor faulting. A mass-transport deposit, with probable variable sediment properties and possible overconsolidated soils, will be encountered within the conductor zone. The following discussions on stratigraphy and lithology are based on seismic character. No existing wells are present in the vicinity to correlate stratigraphy to the proposed wellsite.

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -1,884 ft (Map GB 491 SL4-1). The seafloor slopes to the southwest at 5.2° (Map GB 491 SL4-2). The GB 491 SL4 location situated in an area of abundant seafloor faulting. The nearest mapped seafloor fault is approximately 475 ft to the west and is downthrown toward the wellsite (Map GB 491 SL4-3). Seafloor offsets along this fault are up to 50 ft, with gradients reaching 18° upslope of the wellsite. There is a potential for minor shallow sediment slides along the steep slopes; however, the surficial sediments appear stable and any slide would likely produce minimal, local runout. A buried fault exhibiting seafloor expression is located 233 ft to the east but is downthrown to the east, away from the wellsite (Map GB 491 SL4-3). An approximate 15 ft surficial drape of soft, high water content silty clays covers the seafloor at the proposed wellsite (Illustration GB 491 SL4-1).

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that are capable of supporting high-density chemosynthetic or other deepwater benthic communities. The side-scan sonar mosaic and seafloor amplitude rendering indicate a relatively homogenous seabed in the vicinity of the proposed location, suggesting normal Gulf of Mexico surficial sediments (Maps GB 491 SL4-4 and GB 491 SL4-5). Several pockmarks are present within 2,000 ft of the proposed wellsite; however, these are interpreted as inactive and are not conducive to hosting deepwater benthic communities (Fugro, 2018). Areas of increased side-scan sonar reflectivity represent changes of angles of incidence along fault scarps or buried pockmarks and are not indicative of hardgrounds.

Stratigraphy. Stratigraphic conditions are shown on Illustrations GB 491 SL4-1 through GB 491 SL4-3. Within the Study Area, two horizons (10 and 20) were mapped from the subbottom profiler data, whereas four horizons (30, 40a, 40b, and 50) and the Top of Salt were mapped from the 3-D seismic data. Horizons 20 and 40a were either not mappable or not present in the vicinity of the proposed wellsite.

The uppermost sediments at the proposed wellsite consist of an approximate 15 ft hemipelagic drape of silty-clays overlying stratified clays and silty-clays (Illustration GB 491 SL4-1). Horizon 10 marks the top of a generally fine-grained mass-transport deposit with some possible sands. This deposit will be encountered at a depth of 82 ft below mudline (bml). The base of this deposit is deeper than the penetration of the subbottom profiler data. The remaining sediments between the seafloor and Horizon 30 (279 ft bml) are likely alternating mass-transport deposits and hemipelagic clays and silty-clays (Illustrations GB 491 SL4-2 and GB 491 SL4-3).

The sedimentary section from Horizon 30 to Horizon 40b (279 ft to 1,506 ft bml) consists of low-amplitude, chaotic reflectors interbedded with low-amplitude, semi-continuous to continuous reflectors (Illustrations GB 491 SL4-2 and GB 491 SL4-3). These sediments are likely clay-prone mass-transport deposits interbedded with fine-grained turbidites and hemipelagic clays. The sediments between Horizon 40b and Horizon 50 (1,506 ft to 2,601 ft bml) likely consist of alternating mass-transport deposits and turbidites containing a mixture of clays, silts, and sands; however, this unit has been highly disturbed and faulted by the influx of shallow salt. Sediments between Horizon 50 and the Top of Salt (2,601 ft to 2,969 ft bml) are likely generally fine-grained mass-transport deposits.

Faults. Three faults will be penetrated by the proposed wellsite between the seafloor and the Top of Salt (Illustrations GB 491 SL4-1 through GB 491 SL4-3). No seafloor faults will be encountered within the conductor zone (0 to 300 ft bml); however, interpretations and inferences are based on the nearest subbottom profiler line (about 210 ft south) to the proposed location. Due to the complex and dense fault network within the area, depth of fault crossing and fault plane orientation may vary at the proposed location.

Seafloor faults will be encountered at depths of approximately 327 ft and 2,314 ft bml. An apparent buried fault will be encountered at 1,272 ft bml. All the faults trend generally north to south and are downthrown to the east. Seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30. Engineers should be aware of the potential for lost circulation across the fault planes.

Shallow Gas and Shallow Water Flow. There is a high potential for encountering shallow gas in the sedimentary section just beneath Horizon 40b (Illustration GB 491 SL4-3). The potential for shallow water flow is considered negligible to low.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below the proposed wellsite (Map GB 491 SL4-6). The nearest mapped anomalies are located approximately 262 ft southeast and 265 ft northwest of the proposed wellsite and are located just beneath Horizon 40b (Illustration GB 491 SL4-2). Abundant high-amplitude anomalies are located within this stratigraphic section, likely representing accumulations of shallow gas. A high potential for encountering shallow gas is assigned through the high-amplitude reflectors between 1,506 ft and 1,618 ft bml (Illustration GB 491 SL4-3). GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. The remaining sediments between Horizon 40b and the Top of Salt (1,618 ft to 2,969 ft bml) are designated with a low potential for encountering significant shallow gas (Illustration GB 491 SL4-3). There is a negligible potential for shallow gas in the generally fine-grained sediments between the seafloor and Horizon 40b (1,506 ft bml).

Shallow Water Flow. The potential for shallow water flow at this well location is considered negligible to low due to the stratigraphic framework, and the abundant faulting above salt, which likely reduces the potential for continuous overpressures. However, the lack of well control in the region makes an accurate risk assessment difficult. A low potential for shallow water flow is designated within the sand-prone sediments between Horizon 40b and the Top of Salt (1,506 ft to 2,969 ft bml). Sand layers are likely to be encountered; however, continuous overpressures are not expected. A negligible potential for overpressured sands is assessed within the generally fine-grained sediments between the seafloor and Horizon 40b (1,506 ft bml).

Results

No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed location. In addition, no unidentified sonar targets were delineated on the side-scan sonar data in the vicinity of the proposed wellsite.

Generally fine-grained mass-transport deposits, with some possible sands will be encountered within the conductor zone (0 to 300 ft bml). Caution is recommended while jetting through mass-transport deposits with respect to variable and potentially overconsolidated sediments.

Three faults will be encountered between the seafloor and the Top of Salt at depths of approximately 327 ft, 1,272 ft, and 2,314 ft bml. The seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30. Engineers should be aware of the potential for lost circulation across the fault planes.

It is likely that sand layers will be encountered in the shallow section between Horizons 40b and 50 (1,506 ft to 2,601 ft bml). There is a high potential for encountering shallow gas within the high-amplitude reflectors between Horizon 40b (1,506 ft bml) and 1,618 ft bml. GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. There is a negligible to low potential for encountering overpressured sands.

Closing

We appreciate the opportunity to be of service to Kosmos Energy and look forward to working with Kosmos on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Chelcy Berkey
Marine Geologist

Daniel Lanier
President

Christopher Madere
Project Manager/Sr. Geoscientist

Attachments (6 Maps and 3 Figures)

Distribution:
Mr. Leslie Cundiff, Kosmos Energy (1 hardcopy)

REFERENCES

Bureau of Ocean Energy Management (BOEM), 2011, Notice to lessees and operators (NTL) of federal oil and gas leases and pipeline right-of-way (ROW) holders on the outer continental shelf (OCS), Revisions to the list of OCS lease blocks requiring archaeological resource surveys and reports: U. S. Department of the Interior, Bureau of Ocean Energy Management, Bureau of Safety and Environmental Enforcement Gulf of Mexico Region (GOMR), NTL 2011-JOINT-G01. Effective Date December 29, 2011.

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May 29, 2019

Project No.: 0419-2846

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Attention: Mr. Leslie Cundiff

Site Clearance Letter,
Proposed Wellsite GB 492 SL5,
Block 492 (OCS-G-35919),
Garden Banks Area,
Gulf of Mexico

Kosmos Energy (Kosmos) contracted Geoscience Earth & Marine Services (GEMS) to provide an assessment of the seafloor and shallow geologic conditions to determine the favorability of drilling operations for the proposed location GB 492 SL5 in Block 492 (OCS-G-35919), Garden Banks Area, Gulf of Mexico. This letter addresses specific seafloor and subsurface conditions around the proposed location to the Top of Salt, a depth of about 1,647 ft below the mudline (bml).

The proposed wellsite is situated along an area of abundant seafloor faulting. There are no potential sites for deepwater benthic communities within 2,000 ft and no sonar targets were identified in the vicinity of the proposed wellsite. Caution is recommended while jetting through the conductor zone (0 to 300 ft) with respect to variable and potentially overconsolidated sediments within shallow mass-transport deposits. There is a negligible to low potential for encountering overpressured sands between the seafloor and the Top of Salt. A moderate potential for encountering shallow gas exists within relatively high-amplitude reflectors beneath Horizon 40b. Engineers should be aware of the potential for lost circulation across fault planes.

This letter provides details specific to the well location, including available data, Notice to Lessees (NTL) requirements, man-made features, and wellsite conditions.

Proposed Well Location

The surface location for the Proposed Exploration Wellsite GB 492 SL5 lies in the southwestern quadrant of GB 492. Kosmos provided the following coordinates:

Table II-SL5-1. Proposed Location Coordinates

Proposed Wellsite GB 492 SL5			
Spheroid & Datum: Clarke 1866 NAD27 Projection: UTM Zone 15 North		Line Reference	Block Calls (GB 492)
X: 1,461,062 ft	Latitude: 27° 27′ 34.5580″ N	Inline 9737	3,782 ft FWL
Y: 9,964,856 ft	Longitude: 93° 33′ 11.7002″ W	Crossline 3723	1,496 ft FSL

Kosmos plans to drill this well using a dynamically positioned drilling vessel. Our assessment addresses the seafloor conditions within a 2,000-ft radius around the proposed wellsite location.

Available Data

The following discussion is based on the findings provided within Volume I of this report. The text, maps, and figures included in the report provide detail on the regional geology of the Study Area. Kosmos provided exploration 3-D seismic time and depth volumes for the geohazard analysis, covering an approximate 60 mi^2 area that includes all or portions of Federal lease Blocks GB 490-493, 534-537, and 580-581. A seafloor assessment was completed over the "Seafloor Mapping Area" encompassing of all, or portions, of Blocks

GB 490-493 and 534-537. Subsurface mapping was limited to a two-block area covering Blocks GB 491 and 492 (Figure II-SL5-1).

Kosmos also provided high-resolution geophysical data collected by Fugro USA Marine, Inc., (Fugro) in May 2018 using an AUV (Autonomous Underwater Vehicle). These data were acquired over the southern three-quarters of the Study Area (Figure II-SL5-1) and included subbottom profiler, side-scan sonar, multibeam bathymetry, and multibeam backscatter data. Fugro completed Shallow Geohazards and Archaeological Assessments of the AUV Survey Area and submitted the report to BP America Inc., in July 2018 (Fugro, 2018). The digital datasets, mapped features, and completed reports were provided to GEMS for integration into this assessment.

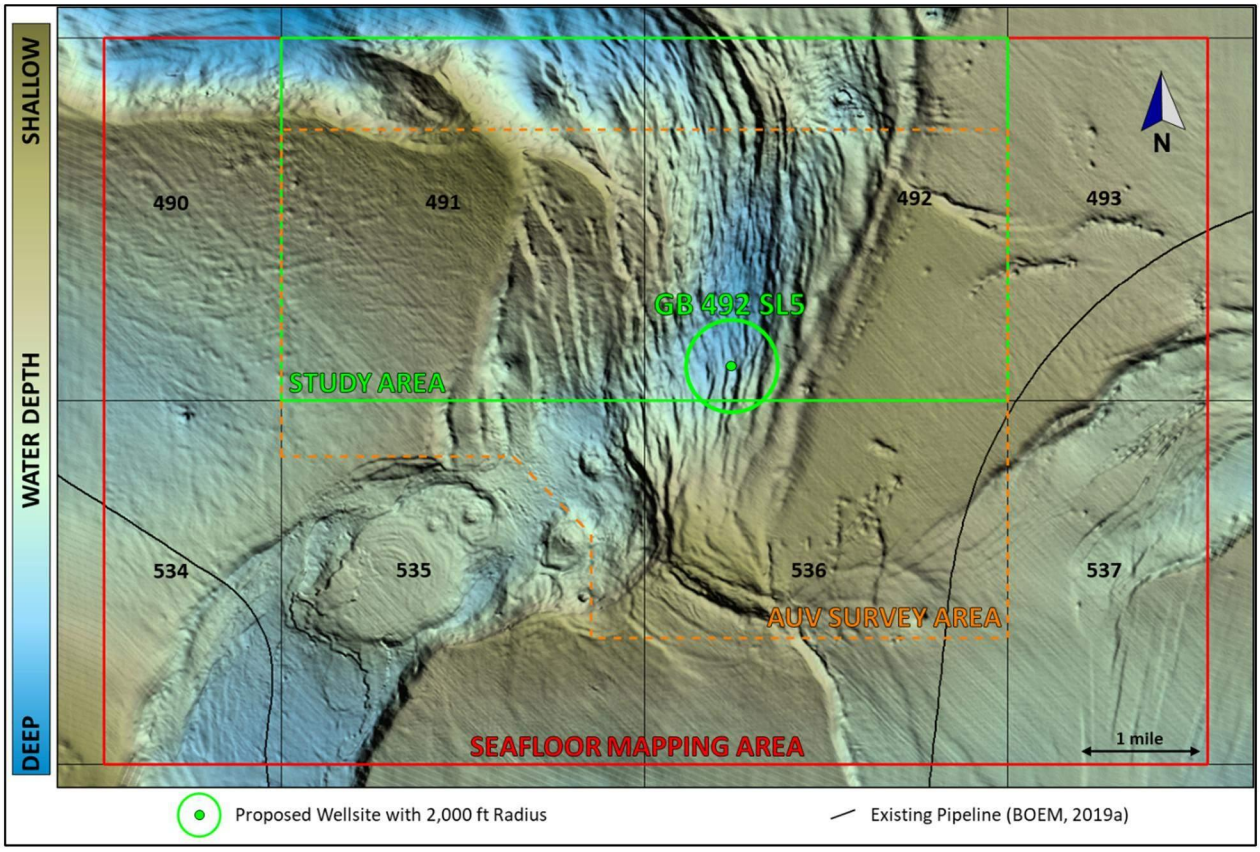

Figure II-SL5-1. Seafloor Rendering surrounding the Garden Banks Study Area

Attachments

Wellsite maps are centered on the Proposed Wellsite GB 492 SL5 and are displayed at a 1 inch = 1,000 ft scale (1:12,000). The maps included in this letter are as follows:

Map No. GB 492 SL5-1: Bathymetry Map
Map No. GB 492 SL5-2: Gradient Map
Map No. GB 492 SL5-3: Seafloor Features Map
Map No. GB 492 SL5-4: Side-Scan Sonar Mosaic
Map No. GB 492 SL5-5: Seafloor Amplitude Rendering
Map No. GB 492 SL5-6: Geologic Features Map

The accompanying illustrations were extracted from the available datasets and are listed below:

Illustration GB 492 SL5-1: Subbottom Profiler Line Showing Near-Surface Conditions Beneath Proposed Wellsite GB 492 SL5

Illustration GB 492 SL5-2: Portions of Inline 9737 and Crossline 3723 Showing Conditions Beneath Proposed Wellsite GB 492 SL5

Illustration GB 492 SL5-3: Tophole Prognosis Chart, Proposed Wellsite GB 492 SL5

NTL Requirements

The following report complies with the Bureau of Ocean Energy Management (BOEM) Notice to Lessees (NTLs) 2009-G40, 2008-G04, and 2008-G05 (MMS, 2010 and 2008a, b) concerning high-density deepwater benthic communities and geohazard assessments. BOEM's NTL 2015-N02 (BOEM, 2015) eliminates the expiration of all NTLs pending further review.

Block GB 492 is not considered to have a high potential for archaeological resources per NTL 2011-JOINT-G01 (BOEM, 2011). However, an archaeological assessment must be completed prior to performing any exploration activities in order to satisfy requirements in BOEMRE's "Pre-Seabed Disturbance Survey Mitigation" (BOEMRE, 2011). Fugro prepared an archaeological assessment to comply with the Archaeological Resource Surveys and Reports requirements in NTL 2005-G07 (MMS, 2005); see Appendix D of the main report.

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic data cube provided by Kosmos at the proposed wellsite (Figure II-SL5-2). The extraction was generated within a 2,000-ft radius of the intersection of the inline and crossline at the proposed wellsite. The extraction interval consisted of the seafloor to approximately 3,000 ft below the seafloor. We converted the amplitude vs. frequency spectrum, generated by the IHS Kingdom software, to power vs. frequency by squaring the amplitude values as described by J. A. Coffeen, 1978. The frequency bandwidth at 50% power ranges from 13 Hz to 76 Hz.

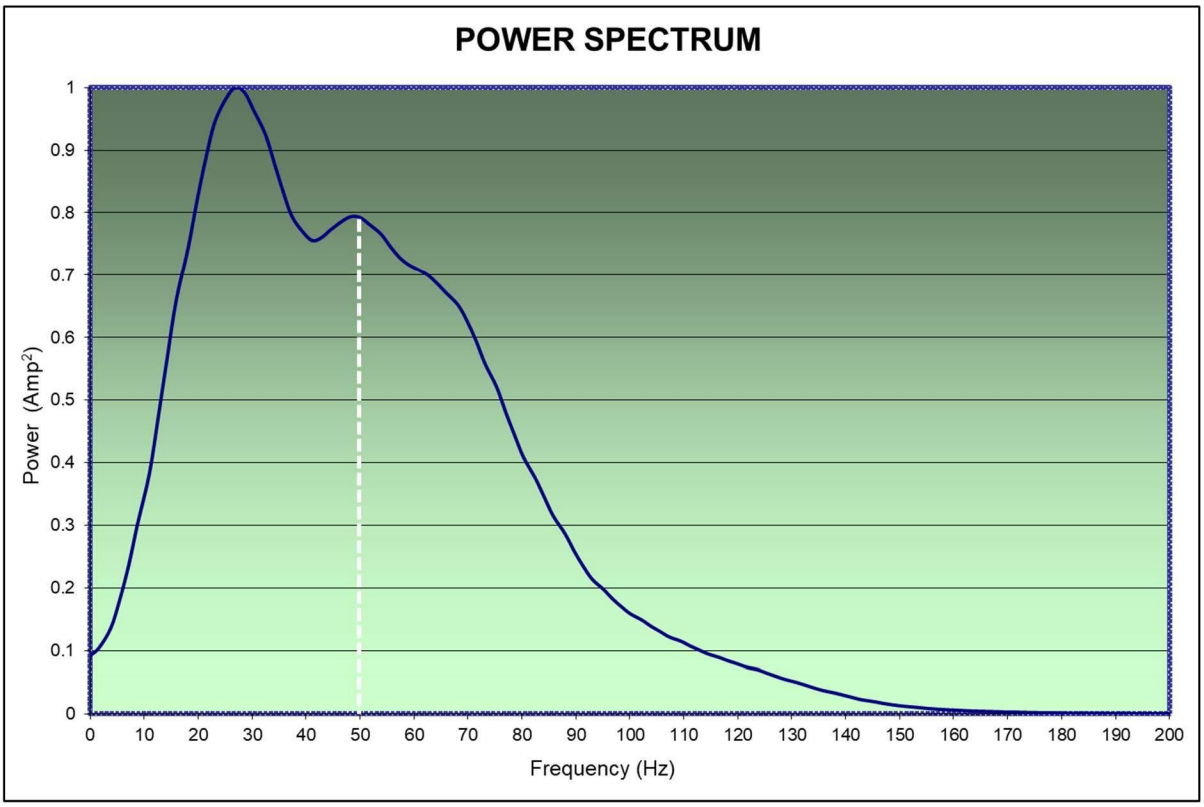

Figure II-SL5-2. Power Spectrum Curve, Proposed Wellsite GB 492 SL5

Man-Made Features

No pipelines, wells, or other man-made infrastructure are reported in the vicinity of Proposed Wellsite GB 492 SL5. No side-scan sonar contacts are located within a 2,000 ft radius of the proposed location. No archaeological avoidances or known shipwrecks exist near the proposed site.

Wellsite Conditions

The proposed location is within an area of abundant seafloor faulting. A mass-transport deposit, with probable variable sediment properties and possible overconsolidated soils, will be encountered within the conductor zone. The following discussions on stratigraphy and lithology are based on seismic character. No existing wells are present in the vicinity to correlate stratigraphy to the proposed wellsite.

Water Depth and Seafloor Conditions. The water depth at the proposed surface location is -2,073 ft (Map GB 492 SL5-1). The seafloor slopes to the northeast at 4.9° (Map GB 492 SL5-2). The GB 492 SL5 location is situated about 170 ft west of a mapped seafloor fault (Map GB 492 SL5-3). Seafloor offsets along this fault are up to 20 ft, with gradients reaching 20° upslope of the wellsite. There is a potential for minor shallow sediment slides along the steep slopes; however, the surficial sediments appear stable and any slide would likely produce minimal, local runout. Two additional seafloor faults are located approximately 110 ft northwest and 165 ft west of the wellsite; however, these are downthrown away from the proposed wellsite location. An approximate 12 ft surficial drape of soft, high water content silty clays covers the seafloor at the proposed wellsite (Illustration GB 492 SL5-1).

Deepwater Benthic Communities. No features or areas were interpreted within 2,000 ft of the proposed location that are capable of supporting high-density chemosynthetic or other deepwater benthic communities. The side-scan sonar mosaic and seafloor amplitude rendering indicate a relatively homogenous seabed in the vicinity of the proposed location, suggesting normal Gulf of Mexico surficial sediments (Maps GB 492 SL5-4 and GB 492 SL5-5). One pockmark is present within 2,000 ft of the proposed wellsite; however, it is interpreted as inactive and is not conducive to hosting deepwater benthic communities (Fugro, 2018). Areas of increased side-scan sonar reflectivity represent changes of angles of incidence along fault scarps or buried pockmarks and are not indicative of hardgrounds.

Stratigraphy. Stratigraphic conditions are shown on Illustrations GB 492 SL5-1 through GB 492 SL5-3. Within the Study Area, two horizons (10 and 20) were mapped from the subbottom profiler data, whereas four horizons (30, 40a, 40b, and 50) and the Top of Salt were mapped from the 3-D seismic data. Horizons 20, 40a, and 50 were either not mappable or not present in the vicinity of the proposed wellsite.

The uppermost sediments at the proposed wellsite consist of an approximate 12 ft hemipelagic drape of silty-clays overlying stratified clays and silty-clays (Illustration GB 492 SL5-1). Horizon 10 marks the top of a generally fine-grained mass-transport deposit with some possible sands. This deposit will be encountered at a depth of 82 ft below mudline (bml). The base of this deposit is deeper than the penetration of the subbottom profiler data. The remaining sediments between the seafloor and Horizon 30 (332 ft bml) are likely alternating mass-transport deposits and hemipelagic clays and silty-clays (Illustrations GB 492 SL5-2 and GB 492 SL5-3).

The sedimentary section from Horizon 30 to Horizon 40b (332 ft to 1,198 ft bml) consists of low-amplitude, chaotic reflectors interbedded with low-amplitude, semi-continuous to continuous reflectors (Illustrations GB 492 SL5-2 and GB 492 SL5-3). These sediments are likely clay-prone mass-transport deposits interbedded with fine-grained turbidites and hemipelagic clays. The sediments between Horizon 40b and the Top of Salt (1,198 ft to 1,647 ft bml) likely consist of alternating mass-transport deposits and turbidites containing a mixture of clays, silts, and sands; however, this unit has been highly disturbed and faulted by the influx of shallow salt.

Faults. Three faults will be penetrated by the proposed wellsite between the seafloor and the Top of Salt (Illustrations GB 492 SL5-1 through GB 492 SL5-3). No seafloor faults will be encountered within the conductor zone (0 to 300 ft bml); however, interpretations and inferences are based on the nearest subbottom profiler line (about 265 ft south) to the proposed location. Due to the complex and dense fault network within the area, depth of fault crossing and fault plane orientation may vary at the proposed location.

Seafloor faults will be encountered at depths of approximately 332 ft and 1,081 ft bml. An apparent buried fault will be encountered at 719 ft bml. All the faults trend generally north to south and are downthrown to the west. Seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30. Engineers should be aware of the potential for lost circulation across the fault planes.

Shallow Gas and Shallow Water Flow. There is a moderate potential for encountering shallow gas in the sedimentary section just beneath Horizon 40b (Illustration GB 492 SL5-3). The potential for shallow water flow is considered negligible to low.

Shallow Gas. There are no apparent high-amplitude anomalies or other direct hydrocarbon indicators directly below the proposed wellsite. The nearest mapped anomalies are located 263 ft south-southwest and 318 ft west of the proposed wellsite and are located just beneath Horizon 40b (Illustration GB 492 SL5-2). Abundant high-amplitude anomalies are located within this stratigraphic section, likely representing accumulations of shallow gas. A moderate potential for encountering shallow gas is assigned through the area of increased amplitude reflectors between 1,198 ft and 1,264 ft bml (Illustration GB 492 SL5-3). GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. The remaining sediments between Horizon 40b and the Top of Salt (1,264 ft to 1,647 ft bml) are designated with a low potential for encountering significant shallow gas (Illustration GB 492 SL5-3). There is a negligible potential for shallow gas in the generally fine-grained sediments between the seafloor and Horizon 40b (1,198 ft bml).

Shallow Water Flow. The potential for shallow water flow at this well location is considered negligible to low due to the stratigraphic framework, and the abundant faulting above salt, which likely reduces the potential for continuous overpressures. However, the lack of well control in the region makes an accurate risk assessment difficult. A low potential for shallow water flow is designated within the sand-prone sediments between Horizon 40b and the Top of Salt (1,198 ft to 1,647 ft bml). Sand layers are likely to be encountered; however, continuous overpressures are not expected. A negligible potential for overpressured sands is assessed within the generally fine-grained sediments between the seafloor and Horizon 40b (1,198 ft bml).

Results

No areas with the potential for deepwater benthic communities are identified within 2,000 ft of the proposed location. In addition, no unidentified sonar targets were delineated on the side-scan sonar data in the vicinity of the proposed wellsite.

Generally fine-grained mass-transport deposits, with some possible sands will be encountered within the conductor zone (0 to 300 ft bml). Caution is recommended while jetting through mass-transport deposits with respect to variable and potentially overconsolidated sediments.

Three faults will be encountered between the seafloor and the Top of Salt at depths of approximately 332 ft, 719 ft, and 1,081 ft bml. The seafloor faults may be currently active; however, any movement is likely at a rate analogous to soil creep. Additional faults may be encountered that cannot be resolved by the 3-D seismic data, particularly below Horizon 30. Engineers should be aware of the potential for lost circulation across the fault planes.

It is likely that sand layers will be encountered in the shallow section between Horizon 40b and the Top of Salt (1,198 ft to 1,647 ft bml). There is a moderate potential for encountering shallow gas within the increased amplitude reflectors between Horizon 40b (1,198 ft bml) and 1,264 ft bml. GEMS recommends setting a casing above this unit, as well as increasing the mud weight while drilling through this interval, in order to mitigate any shallow gas hazards. There is a negligible to low potential for encountering overpressured sands.

Closing

We appreciate the opportunity to be of service to Kosmos Energy and look forward to working with Kosmos on future projects.

Sincerely,

GEOSCIENCE EARTH & MARINE SERVICES

Chelcy Berkey
Marine Geologist

Daniel Lanier
President

Christopher Madere
Project Manager/Sr. Geoscientist

Attachments (6 Maps and 3 Figures)

Distribution:
Mr. Leslie Cundiff, Kosmos Energy (1 hardcopy)

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APPENDIX A: AVAILABLE DATA AND INTERPRETIVE PROCEDURES

AVAILABLE DATA AND INTERPRETIVE PROCEDURES

The maps and profiles presented in this report reflect the interpretation of high-resolution geophysical data collected by Autonomous Underwater Vehicle (AUV) and 3-D seismic data. Identification of all geologic features and stratigraphic variations is limited to the resolution of the available data. Kosmos Energy (Kosmos) provided time and depth 3-D seismic volumes, as well as the high-resolution AUV datasets and reports, for loading on a PC-based workstation for interpretation and identification of geologic constraints. Fugro USA Marine, Inc. (Fugro) completed the AUV interpretation and reporting and provided the completed products to GEMS for incorporation into this assessment. Fugro's AUV Shallow Geohazards and Archaeological Assessment is provided in Appendix D.

3-D Seismic Data Specifications

The data volume provided by Kosmos covers approximately 60 square miles and includes all or portions of 10 Federal lease blocks, including GB 490-493, 534-537, and 580-581. All data are projected in UTM Zone 15 North, using the Clarke 1866 spheroid and the NAD27 datum. All map units are presented in U.S. survey feet. The provided 3-D depth volume was used for all mapping and interpretation procedures performed for this Study. The specifications for the 3-D depth data used for this study are as follows:

Table A-1. 3-D Data Volume Specifications

3-D Data Volume Specifications	
Name	1000DA_Resolution_HiRes_Final_Kirch_near_offset_enhanced_stack_legacy_merge_07232018
Polarity	North American Convention
Phase	Zero Phase
Inline spacing	32.808 ft
Crossline spacing	41.010 ft
Inline range	8770 to 10648 (increment by 1)
Crossline range	3001 to 4521 (increment by 1)
Sample rate	6 ft
Record length	13,122 ft (from 0 to 13,122 ft)
Data resolution	32-bit

As specified in NTL 2008-G04 (MMS, 2008a), GEMS extracted the power spectrum diagram from the 3-D seismic data cube provided by Kosmos for the Study Area (Figure A-1). We converted the amplitude vs. frequency spectrum, generated by the IHS software, to power vs. frequency by squaring the amplitude values as described by J.A. Coffeen, 1978.

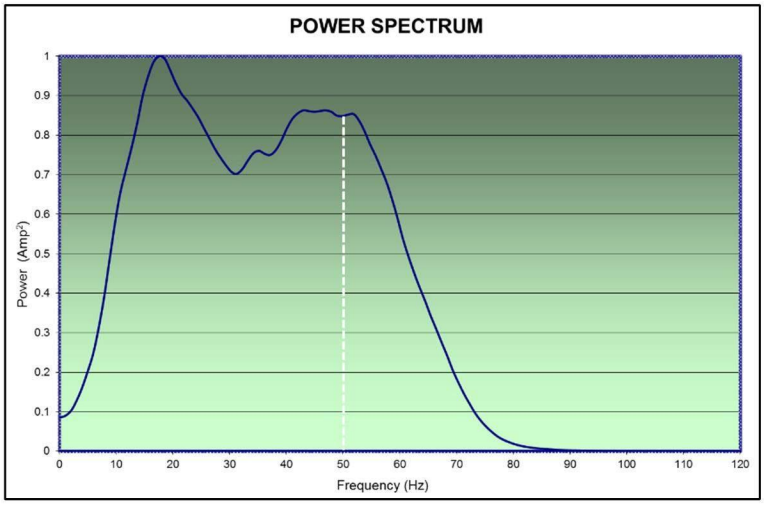

Figure A-1. Power Spectrum Curve (Frequency vs Power)

3-D Data Resolution

The lateral resolution of the dataset is limited by the line (bin) spacing. The data volume provided exceeds the minimum data density requirements set forth by the Minerals Management Service NTL 2008-G05 (MMS, 2008b). The vertical resolution of the dataset is based on the limit of separability, approximated by Rayleigh's criterion, **λ/4** (Brown, 2004). The value of **λ** is represented by the following equation:

λ = V/*f*, where **V** is velocity and ***f*** is frequency.

The average dominant frequency retained in the upper 2,500 ft of sediments was measured using an instantaneous frequency function. A velocity of 5,750 ft/sec calculated with the following relationship:

V = (**D**/***t***)*2, where **D** is the interval thickness in feet and ***t*** is the interval time in seconds.

For the dataset provided, the vertical resolution is approximately 45 ft. Individual strata, thinner than 45 ft, may be detected but not resolved in true thickness.

Exact water depths and details of subtle seafloor topography cannot be resolved and any seafloor obstructions (such as shipwrecks and other debris) usually cannot be detected with the 3-D data used for this assessment. Water depths and seafloor obstructions were defined with the AUV data, where available, provided for this study.

High-Resolution Geophysical Data

Fugro collected the high-resolution geophysical data in May 2018 aboard the R/V *Fugro Enterprise* using the *Echo Surveyor III* AUV. The survey grid consisted of 45 west-east primary tracklines, spaced 150 ft (492 ft) apart and 19 north-south tie lines spaced 500 m (1,640 ft) apart. The AUV collected multibeam bathymetry, backscatter, side-scan sonar, and subbottom profiler data.

Fugro completed the interpretation and reporting, while Kosmos provided the digital data to GEMS for incorporation into this report. For additional information on the high-resolution geophysical survey and data collected, see Fugro's AUV Shallow Geohazards Assessment, provided in Appendix D (Fugro, 2018).

Map 1, Bathymetry Map

The Bathymetry Map (Map 1) represents the bathymetry defined within the Seafloor Mapping Area. The water depth was determined from the provided 3-D seismic depth volume and multibeam bathymetry data. The depths from the 3-D seismic data were on average 7 ft shallower than the multibeam bathymetry data and were adjusted accordingly. The isobaths were constructed in Global Mapper using the x, y, and z file compiled from the multibeam bathymetric and 3-D seismic data. The contours were created at 20-foot intervals.

Map 2, Seafloor Gradient Map

The Seafloor Gradient Map (Map 2) displays a shaded image based on the seafloor slopes in degrees. The slope values were color coded to show the variations in slope over the Seafloor Mapping Area with the steepest slopes represented in red and purple. The gradient image was constructed using Global Mapper software.

Map 3, Seafloor Features Map

Map 3 shows the seafloor features within the Seafloor Mapping Area. The surface rendering constructed from the multibeam bathymetric and 3-D seismic data is used as a background. The features within the AUV Survey Area were interpreted by Fugro from the side scan sonar, subbottom profiler, and multibeam data collected with the AUV (see Appendix D). Seafloor features outside of the AUV Survey Area were mapped based on the 3-D seismic data. The locations of the unidentified sonar contacts are from Fugro's Archaeological Assessment included in Appendix D.

The enhanced surface rendering was generated by GEMS using the Global Mapper software, using the water bottom as determined from the multibeam bathymetric and 3-D seismic data. The image represents color enhancements of depth variances and a constant sun-angle display to provide a uniform depiction of the

elevation differences along the interfaces. A GeoTIFF file was created and imported directly into AutoCAD for scaling and annotation.

Map 4, Seafloor Amplitude Rendering

The Seafloor Amplitude Rendering (Map 4) superimposes the amplitude values of the seafloor peak onto the seafloor rendering surface. The X, Y, and amplitude values were gridded, the color amplitude map was made semi-transparent, and the image was overlain onto the seafloor rendering. This allowed for correlation of the amplitude anomalies with the seafloor bathymetric features.

The Seafloor Amplitude Rendering is used to identify possible areas of hydrocarbon seepage and/or carbonate hardgrounds. Seabed amplitude anomalies (extreme highs and extreme lows) possibly relate to the presence of venting hydrocarbons and/or authigenic carbonates as shown in various studies (Roberts et al., 1990; Booth et al., 1996; Doyle et al., 1996). These renderings aid in selecting drilling locations and ensuring that drilling activities or anchoring do not impact any potential deepwater benthic communities as defined in NTL 2009-G40 (MMS, 2010).

Map 5, Side-Scan Sonar Mosaic

Map 5 displays the side-scan sonar mosaic within the AUV Survey Area. The mosaic was provided to GEMS by Kosmos. Superimposed on the mosaic are the unidentified sonar contacts mapped by Fugro (2018), which are believed to be of man-made origin.

Maps 6, 7, and 8, Isopach and Structure Maps

Four stratigraphic horizons (Horizons 30, 40a, 40b, and 50) and the Top of Salt were mapped from the 3-D seismic depth dataset. Horizons were mapped on the depth dataset in order to determine accurate depths below mudline. The seafloor depth was subtracted from the horizon depth to generate thicknesses between the seafloor and each horizon. For the report, Horizons 40a, 40b, and the Top of Salt were exported to create hard-copy maps. Two Isopach Maps, representing the thickness from the seafloor to Horizon 40a and Horizon 40b, are displayed on Maps 6 and 7, respectively. A Structure Map was produced representing the depth from the sea surface to the Top of Salt (Map 8).

Map 9, Geologic Features Map

The Geologic Features Map (Map 9) is the result of the analysis of the 3-D seismic and AUV-collected datasets. Surface renderings were imported into SMT. Features were mapped as culture layers and exported as DXF files or shapefiles to AutoCAD. Unidentified sonar targets and seafloor features were included on the map from the AUV data analysis performed by Fugro. Seafloor features outside of the AUV Survey Area, as well as subsurface features such as faults and high-amplitude events, were derived from the 3-D seismic data volume.

Assessing Shallow Gas Potential. On zero-phase seismic data, the seafloor is identified as the first positive peak following the water column noise. A slightly weaker negative trough usually precedes and follows the peak. Gassy sediments will usually have a much lower speed of sound and a lower density than the surrounding sediments. Therefore, the acoustic reflection will be reversed in polarity and will be a trough-peak pair. The top of the gassy sediments will be the trough. In addition, with more gas, the reflection amplitude will be higher. Gassy sediments create a high-amplitude trough-peak reflection indicating the top/base of the event. A hard layer will create a high-amplitude peak-trough reflection. Both of these geologic situations will create oval-shaped areas of high-amplitude. However, the gassy sediments will have a trough filling the upper half and the corresponding peak filling the lower half of the oval. A reflection from a hard layer will be the opposite, with a peak over a trough within the high-amplitude envelope oval.

The above criterion was used to distinguish gassy sediments from hard layers. The criteria for the assessment of shallow gas are as follows:

- ***Negligible***: Unlikely to encounter shallow gas, due to the stratigraphic and structural framework of the zone. No anomalous amplitudes are present and no hydrocarbon indicators have been identified.

- ***Low***: Potential for minor amounts of near-normally pressured solution gas in sands.
- ***Moderate***: Increased potential for encountering near-normally pressured solution gas. High-amplitudes with trough-peak reflection character. There are no other direct hydrocarbon indicators; however, the stratigraphic and structural framework may be suitable for the presence of shallow gas.
- ***High***: The stratigraphic and structural framework is ideal for shallow gas accumulation. There are high-amplitude anomalies or "bright spots" with trough-peak reflection character and other direct hydrocarbon indicators. Stratigraphic and structural framework favorable for trapping gas.

Assessing Shallow Water Flow Potential. Identifying depositional facies from seismic data assists in understanding if there is a potential for shallow water flow. Seismic reflections with high-amplitude character, or discontinuous layers of chaotic, rotated beds, are more likely to contain sands. An overlying continuous seal is generally necessary to trap the pore-space fluid. Coarse-grained sediments may be overpressured if the sedimentation rate of the overlying deposits is high. The potential for encountering shallow water flow increases where sands, seals, and high sedimentation rates are present.

Assessments for the potential of shallow water flow within the Study Area are qualitative judgments based on the likelihood of encountering overpressured water sands within the shallow section, taking into account the interpreted lithology, depositional rates, depth of burial, quality of the seal, etc. The evaluation of shallow water flow potential is gauged from negligible to high.

The criteria for the assessment of shallow water flow are as follows:

- ***Negligible***: Unlikely that shallow water flow will occur due to lack of sand and overlying seal, or generally lacks characteristics of a shallow water flow zone.
- ***Low***: Thin sand layers are possible; however, the amplitude and facies characteristics of the interval are not suggestive of overpressured sand layers.
- ***Moderate***: Possible flow zone with a high probability of sand, overlying seal, and rapid burial.
- ***High***: Most likely to flow due to a direct correlation to a known shallow water flow zone and accompanying shallow water flow characteristics.

Seismic Data Examples

The data examples included in this report were selected from the AUV-collected and 3-D seismic datasets to illustrate particular geologic conditions and stratigraphy that are discussed in this report. The examples were generated at select crosslines, inlines, amplitude extractions, and rendered surfaces. These displays were exported to a graphics application for set-up and annotation. The locations of the illustrated seismic profiles are shown on inset index maps on the respective figures.

APPENDIX B: REGIONAL GEOLOGICAL SETTING (SUPPORTING INFORMATION)

REGIONAL GEOLOGIC SETTING (SUPPORTING INFORMATION)

The following appendix further defines the Study Area within the context of the regional geological conditions in the Garden Banks Protraction Area. The regional geologic structures and conditions are derived from various published references and previous investigations in the area.

Regional Structural and Stratigraphic Setting

The Study Area is located on the mid-continental slope in the southeastern portion of the Garden Banks Protraction Area. The base of the continental slope, represented by the Sigsbee Escarpment, is approximately 75 miles south of the Study Area.

Salt. The Garden Banks Area is within the tabular salt-minibasin province (Diegel et al., 1995). This province consists of extensive salt sheets with intervening deepwater sediment-filled minibasins. A thick accumulation of Jurassic-age salt, 160 to 140 million years B.P., underlies most of the Texas-Louisiana continental slope (Lehner, 1969). Sediment loading on the upper slope has caused mobilization of the viscous salt (Humphries, 1978). The continual movement of the salt masses, or diapirs, causes stress on the overlying sediments, which causes the sediments to shear with vertical and lateral movement, i.e. faulting. Movement of salt may be episodic, continual, or catastrophic.

Mobilization of salt affects the surrounding sediments by causing deformation (e.g., faults and/or folds), placing a structural control on sediment depositional patterns. Topographic highs related to salt movement block the downslope transport of sediments. Structural lows around diapirs or salt ridges act as conduits for the transport of sediment downslope and out onto the continental rise. Salt withdrawal basins act as traps for the ponding and accumulation of large volumes of sediment. The structures and depocenters change the focus of sedimentation and cause additional loading of the salt, resulting in repeated episodes of salt movement, subsequent deformation, and shifting slope depocenters. The sediment pathways in this portion of the Garden Banks Area are inherently affected by the structural controls emplaced by the presence and movement of salt. The intraslope basins represent a complex interconnected, or linked pathway, along sediment fairways and channels. These channels, or canyons, provide the pathways for large quantities of sediments to migrate seaward from the shelf and continental landmass towards the abyssal plain.

Faults. A variety of normal, reverse, and strike-slip faults can form in salt tectonic provinces under the appropriate conditions. Fault families indicate local stress deformation and accommodation, and they can reflect larger-scale, more regional processes. Usually, the observed structure in an area reflects a combination of local and regional stresses (Rowan et al., 1999).

Organized and often complex fault patterns create fault families that are unique to different sediment/salt/stress regimes (Rowan et al., 1999). Small-displacement normal faults, large growth faults, and ramp faults are generally associated with extensional settings and form features such as horsts, grabens, and en echelon fault systems (Rowan, 1995). Thrust faults and folds are generally associated with compressional settings and form features such as pop-up structures and thrust imbricate fans (Letouzey et al., 1995 and Rowan, 1995).

Stratigraphy. The near-surface sediments on the continental slope are predominantly very soft, high water-content, silty-clays that are normally consolidated to slightly underconsolidated. In some areas, the near-surface continental slope sediments can be classified as "sensitive" soils (Hooper and Dunlap, 1989). The stability of these units depends on the in-situ strength and the existing slope of the seabed. A generic continental slope soil profile shows a gradual increase in strength with depth along with a corresponding decrease in water content. Actual geotechnical properties; however, can differ greatly from the generic profile due to the presence of buried landslides, turbidity flow deposits, faulting, and the possible presence of gas hydrates.

The mid-continental slope region consists of rapidly subsiding salt-withdrawal mini-basins that have trapped thick sedimentary sections (Diegel et al., 1995). Throughout the Pleistocene, fluctuations in sea level and the shifting of the Mississippi Delta deposystem have supplied various amounts of sediment to the slope and out onto the abyssal plain. Stratigraphic facies within the shallow section consist of bypass and ponded assemblages reflecting the proximity to the major sediment source, sedimentation rate, and dominant sediment type (Winker and Booth, 2000). Bypass type assemblages occur close to the sediment source and consist

primarily of mass-transport complexes, channels, and overbank sedimentation. Bypass facies are generally mud-dominated, although isolated discontinuous sand bodies are possible. Ponded assemblages are recognized by continuous reflection sequences representing turbidite deposition. These facies typically have high-sand percentages and the sands are more continuous (Prather et al., 1998; Winker and Booth, 2000).

Numerous late-Quaternary (last 100,000 years) channel systems and shelf-margin deltas have been mapped and documented in the literature (e.g., Suter and Berryhill, 1985). These channels and deltas provided conduits and distribution systems for coarse-grained sediments to the upper slope province. Finer-grained sediments have subsequently buried these coarse materials. Rapid progradation of the delta-front allowed distribution of sediments onto the slope. Generally, the depositional pathways circumvented already existing uplifted areas, and thus, sands are more pronounced in the canyons and valleys surrounding the diapiric uplifts.

Hydrocarbon Migration and Related Seafloor Features

Thermogenic hydrocarbons are generally believed to form at depths greater than 5 km (>16,400 ft) bsl (below sea level) in the Gulf of Mexico (Kornacki et al., 1994). Biogenic gas can be generated at shallower depths from the decomposition of organic matter or the degradation of migrating hydrocarbons. Hydrocarbons can migrate vertically along diapiric salt bodies and faults, accumulating at a shallower level if a stratigraphic or structural "trap" is encountered. If nothing traps migration, the hydrocarbons will reach the seafloor and be expelled into the water column, in some cases resulting in significant seabed features.

Hydrocarbon Vents. The greater the depth of the gas accumulation beneath the mudline, the more likely pressures greater than hydrostatic may occur (Dutta, 2002). In some instances, the pressure in shallow soils may exceed overburden; thus, releasing gas from the formation that will vent upwards. The venting process can be slow and imperceptible at the seabed, or it can be rapid, forming large topographic features (Neurauter and Bryant, 1989; Neurauter and Roberts, 1992). Active seepage to the seabed is a possible indication of overpressured sediments in the subsurface. Small reservoirs in the near surface may be difficult to control during the initial stages of drilling operations. Gas-charged sediments within and around hydrocarbon vents will vary in strength and lithology; therefore, it is important to delineate such accumulations so that either they can be avoided, or casing/mud programs designed to mitigate their impact.

Gas Hydrates. Gas hydrates have been found in the northern Gulf of Mexico in water depths exceeding 1,500 ft (Brooks et al., 1989). Water depths within the Study Area are within the zone for hydrate formation. Methane hydrates form under high pressure and low temperature, creating an ice-like matrix of methane and water molecules (Kvenvolden and Barnard, 1983). Methane in a solid phase may contain up to 170 times the amount of methane than would be contained in free gas under pressure (Sloan, 1990). Gas hydrate can sometimes be detected on seismic data by the presence of Bottom Simulating Reflectors (BSRs). BSRs mimic the seafloor, crosscut stratigraphy, and are caused by the impedance contrast at the hydrate-gas phase boundary (Holbrook et al., 2002). However, hydrates can also exist where BSRs are not observed. Large accumulations of hydrates can form mounds, and in some cases, are possibly responsible for the formation of large seafloor depressions (Prior et al., 1989; Paull et al., 1995). Shallow salt and faulting are common within the Study Area and immediate surrounding region. In this setting, hydrates are most likely to form in localized areas, as fracture-fill, and they are not expected to be regionally widespread.

Authigenic Carbonates. Venting gasses may react with the interstitial pore water in shallow sediments to produce carbon dioxide and bicarbonates (Roberts et al., 1990). Under proper conditions, this reaction catalyzes the production of calcium and magnesium carbonates. The result is an accumulation of authigenic carbonates creating large caps, or seals, over gaseous sediments and the formation of boulder-like, cemented hard-rock outcrops. Authigenic rock outcrops have been recognized in many areas along the continental slope in association with diapiric uplifts and seafloor fault scarps. At the seafloor, such hard-rock outcrops are commonly associated with textural changes and seafloor amplitude variations. Authigenic carbonate surfaces can pose problems for casing penetration and anchor holding.

Benthic/Chemosynthetic Communities

BOEM defines high-density deepwater benthic communities as "(1) features or areas that could support high-density chemosynthetic communities, or (2) features or areas that could support high-density deepwater corals

and other associated high-density hard-bottom communities" (MMS, 2010). Deepwater is defined as 300 m (984 ft) and deeper. Chemosynthetic communities are organisms that have a food source, at least in part, from chemosynthesis rather than organic carbon derived from plankton or marine photosynthetic algae. These organisms can form colonies consisting of dense assemblages of tubeworms, clams, and mussels, while others consist of mats or traces of the bacteria Beggiatoa (Brooks et al., 1987; Brooks et al., 1989; Kornacki et al., 1994). The highest potential for encountering chemosynthetic communities occurs where there is seepage providing a food source, along with a hard substrate for the communities to attach themselves. Benthic communities, such as deepwater corals which are filter feeders, do not require fluid expulsion, only a hard substrate to attach to.

BOEM has outlined measures requiring operators to "protect high-density benthic communities from potentially harmful anthropogenic activities" (MMS, 2010). Muds and cuttings locations must avoid potential areas of significant benthic communities by at least 2,000 ft. Seafloor disturbances, including those caused by anchors, anchor chains, wire ropes, seafloor template installation, and pipeline construction, must remain at least 250 ft from potential areas of high-density deepwater benthic communities. For seabed activities within 500 ft of such communities, video evidence is required proving the communities were not disturbed.

Shallow salt, migrating hydrocarbons, and seafloor vent features occur along portions of the continental slope within the Gulf of Mexico and could provide suitable conditions for sustaining benthic communities (MMS, 2010). Numerous seafloor expulsion features and hardgrounds are present in the area. Block GB 535 contains areas of visually identified organisms (MMS 2010; BOEM, 2019d).

Shallow Water Flow Sands

Abnormally pressured sands are sand layers of varying thickness encased in low permeability shales and/or clays (Alberty et al., 1997). Rapidly deposited overburden above the clay/shale seal induces pressure in the sands faster than the surrounding seal allows pore fluids to escape. This process, called compaction disequilibrium, is the most common mechanism for overpressures in the Gulf of Mexico (Ostermeier et al., 2000). The higher the net accumulation rate above the seal, the higher the pore water pressures in the sands. Overpressured sands attempt to equilibrate towards hydrostatic once the retention capacity of the seal is exceeded or compromised, or when the unit is allowed communication or connectivity with a hydrostatically or lower pressured unit. Overpressured sands in the shallow section have low formation strengths and fracture gradients, making them extremely sensitive to pressure conditions during drilling (Alberty, 2000; Bruce et al., 2001).

A shallow water flow (SWF) event occurs when water flows from the shallow overpressured sands along the outside of the structural casing to the seafloor (Alberty, 2000). These flows are a particular problem when encountered prior to the establishment of well control (i.e., installation of the blowout preventer, or BOP). In extreme cases, these events can cause large and long-lasting flows, well damage, foundation failure, formation compaction, damaged casing, and re-entry and control problems (Ostermeier et al., 2000). The impact of SWFs may be limited and/or eliminated by careful planning of mud weight and casing programs.

Thomson et al., (1999) found areas experiencing the most severe SWF problems have late Pleistocene deposition rates above 1,500 ft per million years (Myr). Areas with moderate deposition rates (500-1,500 ft/Myr) have had only a few SWF problems, while areas with regional deposition rates of less than 500 ft/Myr have not experienced SWF.

Regional sand-bearing units are considered to have an increased probability for SWF. Most of the reported flows in the Gulf of Mexico appear to be associated with the major sand-prone intraslope fan systems (Winker and Booth, 2000; Ostermeier et al., 2000). The Study Area is located within the major sand-bearing "Orange Unit" of the western Mississippi River depocenter.

APPENDIX C: REFERENCES CITED

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SECTION 4
HYDROGEN SULFIDE INFORMATION

4.1 CONCENTRATION

Kosmos anticipates encountering zero (0) ppm H_2S during the proposed operations.

4.2 CLASSIFICATION

In accordance with Title 30 CFR 250.490(c), Kosmos requests that the area of proposed operations be classified by the BOEM as H_2S **absent.**

The basis for this determination is the evaluation of Dawson Deep offset wells which were drilled to the stratigraphic equivalent of the Sand Series as proposed in this EP, with no H_2S encountered.

Area / Block	Lease	Well	API No.
Garden Banks 625	OCS-G 15927	SS002 ST04BP00	60-807-40660-05
Garden Banks 625	OCS-G 15927	SS002 ST05BP00	60-807-40660-06

4.3 H2S CONTINGENCY PLAN

An H_2S Contingency Plan is not required for the activities proposed in this plan.

4.4 MODELING REPORT

Modeling reports are not required for the activities proposed in this plan.

SECTION 5
BIOLOGICAL, PHYSICAL AND SOCIOECONOMIC INFORMATION

5.1 DEEPWATER BENTHIC COMMUNITIES

The seafloor disturbing activities proposed in this plan are in water depths greater than 300 meters (984'). GEMS was contracted to provide an assessment of the shallow conditions at the proposed surface locations. The purpose of the assessment was to address seafloor conditions that may impact exploratory drilling operations within 2,000 feet of the proposed well sites. Kosmos will avoid all high-density deepwater benthic communities by 2,000 feet from each proposed mud and cuttings discharge location and 250 feet from the location of all other seafloor disturbances. As per NTL No. 2009-G40, "Deepwater Benthic Communities," a map showing the 2,000 foot radius around the well site is included as **Attachment 3-D.**

5.2 TOPOGRAPHIC FEATURES (BANKS)

Activities proposed in this EP do not fall within 305 meters (1000 feet) of a topographic "No Activity Zone;" therefore, no map is required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

5.3 TOPOGRAPHIC FEATURES STATEMENT (SHUNTING)

Activities proposed under this EP will be conducted outside all Topographic Feature Protective Zones; therefore shunting of drill cuttings and drilling fluids is not required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

5.4 LIVE BOTTOMS (PINNACLE TREND FEATURES)

GB 491 / GB 492 are not located within 61 meters (200 feet) of any pinnacle trend feature; therefore, a separate bathymetric map is not required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

5.5 LIVE BOTTOMS (LOW RELIEF)

GB 491 / GB 492 are not located within 30 meters (100 feet) of any live bottom (low relief) feature with vertical relief equal to or greater than 8 feet; therefore, live bottom (low relief) maps are not required per NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas."

5.6 POTENTIALLY SENSITIVE BIOLOGICAL FEATURES MAP

GB 491 / GB 492 are not located within 30 meters (100 feet) of potentially sensitive biological features. In accordance with NTL No. 2009-G39, "Biologically Sensitive Underwater Features and Areas," biologically sensitive area maps are not required.

5.7 THREATENED AND ENDANGERED SPECIES, CRITICAL HABITAT, AND MARINE MAMMAL INFORMATION

The federally listed endangered and threatened species potentially occurring in the lease area and along the Gulf Coast are provided in the table below.

Species	Scientific Name	Status	Potential Presence		Critical Habitat Designated in the Gulf of Mexico
			Lease Area	Coastal	
Marine Mammals					
Manatee, West Indian	*Trichechus manatus latirostris*	E	--	X	Florida (peninsular)
Whale, Blue	*Balaenoptera masculus*	E	X*	--	None
Whale, Bryde's	*Balaenoptera Edeni*	E	X'	--	None
Whale, Finback	*Balaenoptera physalus*	E	X*	--	None
Whale, Humpback	*Megaptera novaeangliae*	E	X*	--	None
Whale, North Atlantic Right	*Eubalaena glacialis*	E	X*	--	None
Whale, Sei	*Balaenopiera borealis*	E	X*	--	None
Whale, Sperm	*Physeter catodon (=macrocephalus)*	E	X	--	None
Terrestrial Mammals					
Mouse, Beach (Alabama, Choctawatchee, Perdido Key, St. Andrew)	*Peromyscus polionotus*	E	-	X	Alabama, Florida (panhandle) beaches
Birds					
Plover, Piping	*Charadrius melodus*	T	-	X	Coastal Texas, Louisiana, Mississippi, Alabama and Florida (panhandle)
Crane, Whooping	*Grus Americana*	E	-	X	Coastal Texas
Reptiles					
Sea Turtle, Green	*Chelonia mydas*	T	X	X	None
Sea Turtle, Hawksbill	*Eretmochelys imbricata*	E	X	X	None
Sea Turtle, Kemp's Ridley	*Lepidochelys kempli*	E	X	X	None
Sea Turtle, Leatherback	*Dermochelys coriacea*	E	X	X	None
Sea Turtle, Loggerhead	*Caretta caretta*	T	X	X	Texas, Louisiana, Mississippi, Alabama, Florida
Fish					
Sturgeon, Gulf	*Acipenser oxyrinchus (=oxyrhynchus) desotoi*	T	X	X	Coastal Louisiana, Mississippi, Alabama and Florida (panhandle)
Manta Ray	Manta Birostris	T	X	X	Texas, Louisiana, Mississippi, Alabama, Florida
Corals					
Coral, Elkhorn	*Acopora palmate*	T	-	X	Florida Keys and Dry Tortugas
Coral, Staghorn	*Acopora cervicornis*	T	-	X	Florida

Abbreviations: E = Endangered; T = Threatened

* The Blue Fin, Brydes, Humpback, North Atlantic Right, and Sei Whales are rare or extralimital in the Gulf of Mexico and are unlikely to be present in the lease area.

5.8 ARCHAEOLOGICAL REPORT

An archaeological report was prepared by Fugro and a digital copy of the report is submitted with this EP.

5.9 AIR AND WATER QUALITY INFORMATION

Air and water quality information is not required to be included in this plan per NTL No. 2008-G04, "Information Requirements for Exploration Plans and Development Operations Coordination Documents."

5.10 SOCIOECONOMIC INFORMATION

Socioeconomic information is not required to be included in this plan per NTL No. 2008-G04, "Information Requirements for Exploration Plans and Development Operations Coordination Documents."

SECTION 6
WASTES AND DISCHARGES INFORMATION

6.1 PROJECTED GENERATED WASTES

"Wastes You Will Generate, Treat and Downhole Dispose or Discharge to the Gulf of Mexico" is included as **Attachment 6-A.**

6.2 MODELING REPORT

Modeling reports are not required for the activities proposed in this plan.

ATTACHMENT 6-A
WASTE ESTIMATED TO BE GENERATED, TREATED AND/OR DOWNHOLE DISPOSED OR DISCHARGED TO THE GOM

Please specify if the amount reported is a total or per well amount and be sure to include appropriate units.

Projected generated waste			Projected ocean discharges		Projected Downhole Disposal
Type of Waste	Composition	Projected Amount	Discharge rate	Discharge Method	Answer *yes* or *no*
Will drilling occur ? If yes, you should list muds and cuttings					
Water-based drilling fluid	Water based drilling fluid	35,000 bbl/well	8,750bbl /day/well	Discharged at mudline prior to BOP and riser installation	No
Cuttings wetted with water-based fluid	Cuttings coated with water based drilling mud	2,422 bbl	606 bbl/day/well	Discharged at mudline prior to BOP and riser installation	No
Cuttings wetted with synthetic-based fluid	Cuttings generated while using synthetic based drilling fluid.	1,644 bbl	82 bbl/day/well	Discharged through shunt pipe 25' below water's surface	No
Synthetic based drilling fluid retained on cuttings	Synthetic based drilling fluid	329 bbl	16.5 bbl/day/well	Discharged through shunt pipe 25' below water's surface	No
Will humans be there? If yes, expect conventional waste					
Domestic waste	Grey water (laundry, galley, lavatory)	14,280 bbl/well	5/bbl/hr/well	Discharged overboard. Associated food waste will be processed using an approved grinder.	No
Sanitary waste	Treated sanitary waste from toilets	14,280 bbl/well	5/bbl/hr/well	USCG approved MSD	No
Is there a deck? If yes, there will be Deck Drainage					
Deck Drainage	Rainwater	285.6 bbl/well	0.1 bbl/hr/well	Oily water is treated in Oily Water Separator	No
Will you conduct well treatment, completion, or workover?					
Well treatment fluids	KCL/HCL/NaCL/NaBr	2000 bbls/well	10 bbl/min/well	N/A	No
Well completion fluids	Low Density, Clear Completion Brines; NaCl, CaCl or NaBr provided they are approved for discharge according to EPA	N/A	N/A	N/A	No
Workover fluids	N/A	N/A	N/A	N/A	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
Desalinization unit discharge	Rejected water from water maker unit	167,792 bbl/well	57 bbl/hr	Cuttings chute	No
Blowout prevent fluid	Stackmagic 200/0/5% glycol based on 2% mixture with potable water	204 bbl/well	12 bbl/week with function test	Discharged from BOP near mudline	No
Ballast water	Uncontaminated seawater used to maintain proper draft	25,704 bbl/well	9 bbl/hr	Discharged Overboard	No
Bilge water	Bilge water	285.6 bbl/well	0.1 bbl/hr	Discharged Overboard	No
Excess cement at seafloor	Cement Slurry	500 bbl/well	250 bbl/day	Discharged at mudline during cementing conductor	No
Fire water	Seawater with no addition of chemicals	N/A	N/A	Discharged Overboard	No
Cooling water	Seawater with no addition of chemicals	N/A	1667 bbl/hr	Discharged Overboard	No
Will you produce hydrocarbons? If yes fill in for produced water.					
Produced water	N/A	N/A	N/A	N/A	No
Please enter *individual* or *general* to indicate which type of NPDES permit you will be covered by?					
General - NPDES ID GMG290573			NOTE: All discharged wastes should comply with the requirements of the NPDES permit.		

NOTE: If you will not have a type of waste for the activity being applied for, enter NA for all columns in the row.

SECTION 7
AIR EMISSIONS INFORMATION

7.1 EMISSIONS WORKSHEETS AND SCREENING QUESTIONS

Screen Questions for EP's	Yes	No
Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: CT = $3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?		X
Are your proposed exploration activities located east of 87.5° W longitude?		X
Do you expect to encounter H_2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X

7.2 SUMMARY INFORMATION

Included as **Attachment 7-A** are Air Emission Worksheets which show the emissions calculations for the Plan Emissions and if different, a set of worksheets showing the emissions calculations for the Complex Total Emissions.

Air Emissions Worksheets for a DP Drillship are enclosed since it would have the highest potential emissions (versus DP Semi-Submersible).

This information was calculated by: Kelley Pisciola
281-698-8519
kelley.pisciola@jccteam.com

Attachment 7-A

OMB Control No. 1010-0151
OMB Approval Expires: 06/30/2021

EXPLORATION PLAN (EP)
AIR QUALITY SCREENING CHECKLIST

COMPANY	Kosmos Energy Gulf of Mexico Operations, LLC
AREA	Garden Banks
BLOCK	491 / 492
LEASE	OCS-G 35918 and 35919
PLATFORM	N/A
WELL	SL 1, SL 2, SL 3, SL 4 and SL 5
COMPANY CONTACT	Kelley Pisciola
TELEPHONE NO.	281-698-8519
REMARKS	Exploration drilling and completing and/or abandoning Wells SL 1, SL 2, SL 3, SL 4 and SL 5 (note: SL 4 and SL 5 are mirror locations and are intended as respud well locations only).

EMISSIONS FACTORS

Fuel Usage Conversion Factors	Natural Gas Turbines		Natural Gas Engines		Diesel Recip. Engine		REF.	DATE
	SCF/hp-hr	9.524	SCF/hp-hr	7.143	GAL/hp-hr	0.0483	AP42 3.2-1	4/76 & 8/84

Equipment/Emission Factors	units	PM	SOx	NOx	VOC	CO	REF.	DATE
NG Turbines	gms/hp-hr		0.00247	1.3	0.01	0.83	AP42 3.2-1& 3.1-1	10/96
NG 2-cycle lean	gms/hp-hr		0.00185	10.9	0.43	1.5	AP42 3.2-1	10/96
NG 4-cycle lean	gms/hp-hr		0.00185	11.8	0.72	1.6	AP42 3.2-1	10/96
NG 4-cycle rich	gms/hp-hr		0.00185	10	0.14	8.6	AP42 3.2-1	10/96
Diesel Recip. < 600 hp.	gms/hp-hr	1	0.1835	14	1.12	3.03	AP42 3.3-1	10/96
Diesel Recip. > 600 hp.	gms/hp-hr	0.32	0.1835	11	0.33	2.4	AP42 3.4-1	10/96
Diesel Boiler	lbs/bbl	0.084	0.3025	0.84	0.008	0.21	AP42 1.3-12,14	9/98
NG Heaters/Boilers/Burners	lbs/mmscf	7.6	0.593	100	5.5	84	P42 1.4-1, 14-2, & 14	7/98
NG Flares	lbs/mmscf		0.593	71.4	60.3	388.5	AP42 11.5-1	9/91
Liquid Flaring	lbs/bbl	0.42	6.83	2	0.01	0.21	AP42 1.3-1 & 1.3-3	9/98
Tank Vapors	lbs/bbl				0.03		E&P Forum	1/93
Fugitives	lbs/hr/comp.				0.0005		API Study	12/93
Glycol Dehydrator Vent	lbs/mmscf				6.6		La. DEQ	1991
Gas Venting	lbs/scf				0.0034			

Sulphur Content Source	Value	Units
Fuel Gas	3.33	ppm
Diesel Fuel	0.05	% weight
Produced Gas(Flares)	3.33	ppm
Produced Oil (Liquid Flaring)	1	% weight

EMISSIONS CALCULATIONS 1ST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL	CONTACT	PHONE	REMARKS
Kosmos Energy Gulf of Mexico Operations, LLC	Garden Banks	491 / 492	OCS-G 35918 and 35919	N/A	SL 1, SL 2, SL 3, SL 4 and SL 5	Kelley Pisciola	281-698-8519	Exploration drilling and completing and/or abandoning Wells SL 1, SL 2, SL 3, SL 4 and SL 5 (note: SL 4 and SL 5 are mirror locations and are intended as respud well locations only).

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61800	2984.94	71638.56	24	122	43.56	24.98	1497.36	44.92	326.70	63.77	36.57	2192.13	65.76	478.28
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 x week	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	8	35	5.07	2.91	174.45	5.23	38.06	0.71	0.41	24.42	0.73	5.33
2 x week	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	10	35	5.07	2.91	174.45	5.23	38.06	0.89	0.51	30.53	0.92	6.66
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2019	YEAR TOTAL						53.71	30.80	1846.26	55.39	402.82	65.37	37.49	2247.08	67.41	490.27
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											4795.20	4795.20	4795.20	4795.20	93408.68
	144.0															

EMISSIONS CALCULATIONS 2ND YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL	CONTACT	PHONE	REMARKS
Kosmos Energy Gulf of Mexico Operations, LLC	Garden Banks	491 / 492	OCS-G 35918 and 35919	N/A	SL 1, SL 2, SL 3, SL 4 and SL 5	Kelley Pisciola	281-698-8519	Exploration drilling and completing and/or abandoning Wells SL 1, SL 2, SL 3, SL 4 and SL 5 (note: SL 4 and SL 5 are mirror locations and are intended as respud well locations only).

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61800	2984.94	71638.56	24	158	43.56	24.98	1497.36	44.92	326.70	82.59	47.36	2838.99	85.17	619.42
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 x week	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	8	45	5.07	2.91	174.45	5.23	38.06	0.91	0.52	31.40	0.94	6.85
2 x week	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	10	45	5.07	2.91	174.45	5.23	38.06	1.14	0.65	39.25	1.18	8.56
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	GAS FLARE		208333.3		24	4		0.12	14.87	12.56	80.94		0.01	0.71	0.60	3.88
2020	YEAR TOTAL						53.71	30.92	1861.13	67.95	483.76	84.64	48.54	2910.35	87.89	638.72
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											4795.20	4795.20	4795.20	4795.20	93408.68
	144.0															

EMISSIONS CALCULATIONS 3RD YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT		PHONE	REMARKS
Kosmos Energy Gulf of Mexico Operations, LLC	Garden Banks	491 / 492	OCS-G 35918 and 35919	N/A	SL 1, SL 2, SL 3, SL 4 and SL 5			Kelley Pisciola	281-698-8519	Exploration drilling and completing and/or abandoning Wells SL 1, SL 2, SL 3, SL 4 and SL 5 (note: SL 4 and SL 5 are mirror locations and are intended as respud well locations only).

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61800	2984.94	71638.56	24	140	43.56	24.98	1497.36	44.92	326.70	73.18	41.96	2515.56	75.47	548.85
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 x week	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	8	40	5.07	2.91	174.45	5.23	38.06	0.81	0.47	27.91	0.84	6.09
2 x weej	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	10	40	5.07	2.91	174.45	5.23	38.06	1.01	0.58	34.89	1.05	7.61
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	GAS FLARE		208333.3		24	2		0.12	14.87	12.56	80.94		0.00	0.36	0.30	1.94
2021	YEAR TOTAL						53.71	30.92	1861.13	67.95	483.76	75.01	43.01	2578.72	77.65	564.49
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											4795.20	4795.20	4795.20	4795.20	93408.68
	144.0															

EMISSIONS CALCULATIONS 4TH YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
Kosmos Energy Gulf of Mexico Operations, LLC	Garden Banks	491 / 492	OCS-G 35918 and 35919	N/A	SL 1, SL 2, SL 3, SL 4 and SL 5		Kelley Pisciola	281-698-8519	Exploration drilling and completing and/or abandoning Wells SL 1, SL 2, SL 3, SL 4 and SL 5 (note: SL 4 and SL 5 are mirror locations and are intended as respud well locations only).

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61800	2984.94	71638.56	24	140	43.56	24.98	1497.36	44.92	326.70	73.18	41.96	2515.56	75.47	548.85
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 x week	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	8	40	5.07	2.91	174.45	5.23	38.06	0.81	0.47	27.91	0.84	6.09
2 x week	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	10	40	5.07	2.91	174.45	5.23	38.06	1.01	0.58	34.89	1.05	7.61
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WELL TEST	GAS FLARE		208333.3		24	2		0.12	14.87	12.56	80.94		0.00	0.36	0.30	1.94
2022	YEAR TOTAL						53.71	30.92	1861.13	67.95	483.76	75.01	43.01	2578.72	77.65	564.49
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											4795.20	4795.20	4795.20	4795.20	93408.68
	144.0															

EMISSIONS CALCULATIONS 5TH YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL		CONTACT	PHONE	REMARKS
Kosmos Energy Gulf of Mexico Operations, LLC	Garden Banks	491 / 492	OCS-G 35918 and 35919	N/A	SL 1, SL 2, SL 3, SL 4 and SL 5		Kelley Pisciola	281-698-8519	Exploration drilling and completing and/or abandoning Wells SL 1, SL 2, SL 3, SL 4 and SL 5 (note: SL 4 and SL 5 are mirror locations and are intended as respud well locations only).

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	61800	2984.94	71638.56	24	140	43.56	24.98	1497.36	44.92	326.70	73.18	41.96	2515.56	75.47	548.85
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 x week	VESSELS>600hp diesel(crew)	7200	347.76	8346.24	8	40	5.07	2.91	174.45	5.23	38.06	0.81	0.47	27.91	0.84	6.09
2 x week	VESSELS>600hp diesel(supply)	7200	347.76	8346.24	10	40	5.07	2.91	174.45	5.23	38.06	1.01	0.58	34.89	1.05	7.61
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		208333.3		24	2		0.12	14.87	12.56	80.94		0.00	0.36	0.30	1.94
2023	YEAR TOTAL						53.71	30.92	1861.13	67.95	483.76	75.01	43.01	2578.72	77.65	564.49
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											4795.20	4795.20	4795.20	4795.20	93408.68
	144.0															

SUMMARY

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL
Kosmos Energy Gulf of Mexico Operations, LLC	Garden Banks	491 / 492	OCS-G 35918 and 35919	N/A	SL 1, SL 2, SL 3, SL 4 and SL 5

Year	Emitted Substance				
	PM	SOx	NOx	VOC	CO
2019	65.37	37.49	2247.08	67.41	490.27
2020	84.64	48.54	2910.35	87.89	638.72
2021	75.01	43.01	2578.72	77.65	564.49
2022	75.01	43.01	2578.72	77.65	564.49
2023	75.01	43.01	2578.72	77.65	564.49
Allowable	4795.20	4795.20	4795.20	4795.20	93408.68

SECTION 8
OIL SPILL INFORMATION

8.1 OIL SPILL RESPONSE PLANNING

All the proposed activities and facilities in this EP will be covered by the Oil Spill Response Plan (OSRP) filed by Kosmos Energy Gulf of Mexico Operations, LLC (Company No. 03362) dated April, 2019, last approved on July 19, 2019 (OSRP Control No. O-1037).

8.2 SPILL RESPONSE SITES

Primary Response Equipment Location	Preplanned Staging Location
Houma, LA	Houma, LA
Leeville, LA	Fourchon, LA
	Venice, LA

8.3 OSRO INFORMATION

Kosmos' primary equipment provider is Clean Gulf Associates (CGA). Clean Gulf Associates Services, LLC (CGAS) will provide closest available personnel, as well as a supervisor to operate the equipment. Kosmos has contracted with Marine Spill Response Company (MSRC) as a supplemental spill response provider. MSRC STARS network will provide closest available personnel, as well as an MSRC supervisor to operate the equipment.

8.4 WORST CASE SCENARIO DETERMINATION

Category	Regional OSRP WCD - Drilling	EP WCD - Drilling
Type of activity	Drilling	Drilling
Facility location (area/block)	GB 491	GB 491
Facility designation	SL 3	SL 3
Distance to nearest shoreline (miles)	144	144
Storage tanks (bbl)	0	0
Uncontrolled blowout (bbl)	430,400	430,400
Total volume (bbl)	**430,400**	**430,400**
Type of oil(s) (crude, condensate, diesel)	Crude Oil	Crude Oil
API gravity	31°	31°

Kosmos has determined that the worst-case scenario from the activities proposed in this EP does not supersede the worst-case scenario from our approved Regional OSRP.

Since Kosmos has the capability to respond to the worst-case spill scenario included in our Regional OSRP approved on July 19, 2019, and since the worst-case scenario determined for our EP does not replace the worst-case scenario in our Regional OSRP, Kosmos hereby certifies that Kosmos has the capability to respond, to the maximum extent practicable, to a worst-case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in this EP.

8.5 OIL SPILL RESPONSE DISCUSSION

The Oil Spill Response Discussion is included as **Attachment 8-A.**

8.6 MODELING REPORT

Modeling reports are not required for the activities proposed in this plan.

Attachment 8-A

SPILL RESPONSE DISCUSSION

For the purpose of NEPA and Coastal Zone Management Act analysis, the largest spill volume originating from the proposed activity would be a well blowout during drilling operations, estimated to be 430,400 barrels of crude oil with an API gravity of 31°.

Land Segment and Resource Identification

Trajectories of a spill and the probability of it impacting a land segment have been projected utilizing information in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website. The results are shown in **Figure 1.** The BOEM OSRAM identifies an 8% probability of impact to the shorelines of Galveston County, Texas, Matagorda County, Texas, and/or Cameron Parish, Louisiana within 30 days.

Galveston County includes the Gulf Beach from the west end of Galveston Island at Texas Highway 3005 to the east coast of High Island at the Jefferson County line. Habitats include marshes at the west end of Seawall Boulevard and on the east end of the island and open beaches and avian feeding areas all along the coastline, including a National Audubon Society Sanctuary. The waters of Galveston Bay are classified as an EPA National Estuary.

Matagorda County stretches from Matagorda Bay, across the Colorado River and up to the border of San Bernard Wildlife Refuge (immediately west of the San Bernard River). The county includes Matagorda Peninsula on the Gulf coast and Matagorda Bay. This area is primarily open beach. However, marshland exists along the east side of Matagorda Bay. Several bird rookeries are present around the peninsula. Seagrass is present off of Matagorda Peninsula on the bay side.

Cameron Parish includes the east side of Sabine Lake, Sabine National Wildlife Refuge, Calcasieu Lake, Lacassine National Wildlife Refuge (inland) and Grand Lake. Cameron Parish also includes the area along the coastline from Sabine Pass to Big Constance Lake in Rockefeller Wildlife Refuge. This region is composed of open public beaches, marshlands and swamps. It serves as a habitat for numerous birds, finfish and other animals, including several rare, threatened and endangered species.

Response

Kosmos will make every effort to respond to the Worst Case Discharge as effectively as practicable. A description of the response equipment under contract to contain and recover the Worst Case Discharge is shown in **Figure 2.**

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 13% or approximately 55,952 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 374,448 barrels remaining.

Natural Weathering Data: GB 491, Well No. 3	Barrels of Oil
WCD Volume	430,400
Less 13% natural evaporation/dispersion	55,952
Remaining volume	374,448

Figure 2 outlines equipment, personnel, materials and support vessels as well as temporary storage equipment available to respond to the worst case discharge. The volume accounts for the amount remaining after evaporation/dispersion at 24 hours. The list estimates individual times needed for procurement, load out, travel time to the site and deployment. **Figure 2** also indicates how operations will be supported.

Kosmos's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If aerial dispersants are utilized, 8 sorties (9,600 gallons) from two of the DC-3 aircrafts and 4 sorties (8,000 gallons) from the Basler aircraft would provide a daily dispersant capability of 7,540 barrels. If the conditions are favorable for in-situ burning, the proper approvals have been obtained and the proper planning is in place, in-situ burning of oil may be attempted. Slick containment boom would be immediately called out and on-scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA and MSRC spill response equipment, with a total derated skimming capacity of 1,194,343 barrels. Temporary storage associated with skimming equipment equals 320,296 barrels. If additional storage is needed, various storage barges with a total capacity 880,000+ bbls may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be accomplished and operations deemed safe prior to any containment/skimming attempts.**

If the spill went unabated, shoreline impact in Galveston County, Texas, Matagorda County, Texas, and/or Cameron Parish, Louisiana would depend upon existing environmental conditions. Shoreline protection would include the use of CGA and MSRC near shore and shallow water skimmers with a totaled derated skimming capacity of 294,320 barrels. Temporary storage associated with skimming equipment equals 9,437 barrels. If additional storage is needed, various storage barges with a total capacity 361,000+ bbls may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. A Letter of Intent from OMI Environmental will ensure access to 31,400 feet of 18" shoreline protection boom. **Figure 2** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies would be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. Shoreline protection strategies depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering

Louisiana's coastal wetlands. Each response mode is schematically represented to show optimum deployment and operation of the equipment in areas of environmental concern. Supervisory personnel have the option to modify the deployment and operation of equipment allowing a more effective response to site-specific circumstances. The UC should take into consideration all appropriate items detailed in Tactics discussion of this Appendix. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances. Kosmos's contract Incident Management Team has access to the applicable ACP(s) and GRP(s).

Based on the anticipated worst case discharge scenario, Kosmos can be onsite with contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within an estimated 89 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC)).

Initial Response Considerations

Actual actions taken during an oil spill response will be based on many factors to include but not be limited to:

- Safety
- Weather
- Equipment and materials availability
- Ocean currents and tides
- Location of the spill
- Product spilled
- Amount spilled
- Environmental risk assessments
- Trajectory and product analysis
- Well status, i.e., shut in or continual release

Kosmos will take action to provide a safe, aggressive response to contain and recover as much of the spilled oil as quickly as it is safe to do so. In an effort to protect the environment, response actions will be designed to provide an "in-depth" protection strategy meant to recover as much oil as possible as far from environmentally sensitive areas as possible. Safety will take precedence over all other considerations during these operations.

Coordination of response assets will be supervised by the designation of a SIMOPS group as necessary for close quarter vessel response activities. Most often, this group will be used during source control events that require a significant number of large vessels operating independently to complete a common objective, in close coordination and support of each other. This group must also monitor the subsurface activities of each vessel (ROV, dispersant application, well control support, etc.). The SIMOPS group leader reports to the Source Control Section Chief.

In addition, these activities will be monitored by the Incident Management Team (IMT) and Unified Command via a structured Common Operating Picture (COP) established to track resource and slick movement in real time.

Upon notification of a spill, the following actions will be taken:

- Information will be confirmed
- An assessment will be made and initial objectives set
- OSROs and appropriate agencies will be notified
- ICS 201, Initial Report Form completed
- Initial Safety plan will be written and published
- Unified Command will be established
    - Overall safety plan developed to reflect the operational situation and coordinated objectives
    - Areas of responsibility established for Source Control and each surface operational site
    - On-site command and control established

Offshore Response Actions

Equipment Deployment

Surveillance

- Surveillance Aircraft: within two hours of QI notification, or at first light
- Provide trained observer to provide on site status reports
- Provide command and control platform at the site if needed
- Continual surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continual monitoring of vessel assets using vessel monitoring systems

Dispersant application assets

- Put ASI on standby
- With the FOSC, conduct analysis to determine appropriateness of dispersant application (refer to Section 18)
- Gain FOSC approval for use of dispersants on the surface
- Deploy aircraft in accordance with a plan developed for the actual situation
- Coordinate movement of dispersants, aircraft, and support equipment and personnel
- Confirm dispersant availability for current and long range operations
- Start ordering dispersant stocks required for expected operations

Containment boom

- Call out early and expedite deployment to be on scene ASAP
- Ensure boom handling and mooring equipment is deployed with boom
- Provide continuing reports to vessels to expedite their arrival at sites that will provide for their most effective containment
- Use Vessels of Opportunity (VOO) to deploy and maintain boom

Oceangoing Boom Barge

- Containment at the source
- Increased/enhanced skimmer encounter rate
- Protection booming

In-situ Burn assets

- Determine appropriateness of in-situ burn operation in coordination with the FOSC and affected SOSC
- Determine availability of fire boom and selected ignition systems
- Start ordering fire boom stocks required for expected operations
- Contact boom manufacturer to provide training & tech support for operations, if required
- Determine assets to perform on water operation
- Build operations into safety plan
- Conduct operations in accordance with an approved plan
- Initial test burn to ensure effectiveness

Dedicated off-shore skimming systems
General

- Deployed to the highest concentration of oil
- Assets deployed at safe distance from aerial dispersant and in-situ burn operations

CGA HOSS Barge

- Use in areas with heaviest oil concentrations
- Consider for use in areas of known debris (seaweed, and other floating materials)

CGA 95' Fast Response Vessels (FRVs)

- Designed to be a first vessel on scene
- Capable of maintaining the initial Command and Control function for on water recovery operations
- 24 hour oil spill detection capability
- Highly mobile and efficient skimming capability
- Use as far off-shore as safely possible

CGA FRUs

- To the area of the thickest oil
- Use as far off-shore as allowed
- VOOs 140' – 180' in length
- VOOs with minimum of 18' x 38' or 23' x 50' of optimum deck space
- VOOs in shallow water should have a draft of <10 feet when fully loaded

T&T Koseq Skimming Systems

- To the area of the thickest oil
- Use as far off-shore as allowed
- VOOs with a minimum of 2,000 bbls storage capacity
- VOOs at least 200' in length
- VOOs with deck space of 100' x 40' to provide space for arms, tanks, and crane
- VOOs for shallow water should be deck barges with a draft of <10 feet when fully loaded

Storage Vessels

- Establish availability of CGA contracted assets (See Appendix E)
- Early call out (to allow for tug boat acquisition and deployment speeds)
- Phase mobilization to allow storage vessels to arrive at the same time as skimming systems
- Position as closely as possible to skimming assets to minimize offloading time

Vessels of Opportunity (VOO)

- Use Kosmos's contracted resources as applicable
- Industry vessels are ideal for deployment of Vessel of Opportunity Skimming Systems (VOSS)
- Acquire additional resources as needed
- Consider use of local assets, i.e. fishing and pleasure craft for ISB operations or boom tending
- Expect mission specific and safety training to be required
- Plan with the US Coast Guard for vessel inspections
- Place VOOs in Division or Groups as needed
- Use organic on-board storage if appropriate
- Maximize non-organic storage appropriate to vessel limitations
- Decant as appropriate after approval to do so has been granted
- Assign bulk storage barges to each Division/Group
- Position bulk storage barges as close to skimming units as possible
- Utilize large skimming vessel (e.g. barges) storage for smaller vessel offloading
- Maximize skimming area (swath) to the optimum width given sea conditions and available equipment
- Maximize use of oleophilic skimmers in all operations, but especially offshore
- Nearshore, use shallow water barges and shuttle to skimming units to minimize offloading time
- Plan and equip to use all offloading capabilities of the storage vessel to minimize offloading time

Adverse Weather Operations:

In adverse weather, when seas are $\geq$ 3 feet, the use of larger recovery and storage vessels, oleophilic skimmers, and large offshore boom will be maximized. KOSEQ Arm systems are built for rough conditions, and they should be used until their operational limit (9.8' seas) is met. Safety will be the overriding factor in all operations and will cease at the order of the Unified Command, vessel captain, or in an emergency, "stop work" may be directed by any crew member.

Surface Oil Recovery Considerations and Tactics
(Offshore and Near-shore Operations)

Maximization of skimmer-oil encounter rate

- Place barges in skimming task forces, groups, etc., to reduce recovered oil offloading time
- Place barges alongside skimming systems for immediate offloading of recovered oil when practicable
- Use two vessels, each with heavy sea boom, in an open-ended "V" configuration to funnel surface oil into a trailing skimming unit's organic, V-shaped boom and skimmer (see page 7, *CGA Equipment Guide Book and Tactic Manual* (CGATM)

- Use secondary vessels and heavy sea boom to widen boom swath beyond normal skimming system limits (see page 15, CGATM)
- Consider night-time operations, first considering safety issues
- Utilize all available advanced technology systems (IR, X-Band Radar, etc.) to determine the location of, and move to, recoverable oil
- Confirm the presence of recoverable oil prior to moving to a new location

Maximize skimmer system efficiency

- Place weir skimming systems in areas of calm seas and thick oil
- Maximize the use of oleophilic skimming systems in heavier seas
- Place less mobile, high EDRC skimming systems (e.g. HOSS Barge) in the largest pockets of the heaviest oil
- Maximize onboard recovered oil storage for vessels.
- Obtain authorization for decanting of recovered water as soon as possible
- Use smaller, more agile skimming systems to recover streamers of oil normally found farther from the source. Place recovered oil barges nearby

Recovered Oil Storage

- Smaller barges in larger quantities will increase flexibility for multi-location skimming operations
- Place barges in skimming task forces, groups, etc., to reduce recovered oil offloading time
- Procure and deploy the maximum number of portable tanks to support Vessel of Opportunity Skimming Systems if onboard storage is not available
- Maximize use of the organic recovered oil storage capacity of the skimming vessel

Command, Control, and Communications (C^3)

- Publish, implement, and fully test an appropriate communications plan
- Design an operational scheme, maintaining a manageable span of control
- Designate and mark C^3 vessels for easy aerial identification
- Designate and employ C^3 aircraft for task forces, groups, etc.
- Use reconnaissance air craft and Rapid Response Teams (RAT) to confirm the presence of recoverable oil

On Water Recovery Group
When the first skimming vessel arrives on scene, a complete site assessment will be conducted before recovery operations begin. Once it is confirmed that the air monitoring readings for O2, LEL, H2S, CO, VOC, and Benzene are all within the permissible limits, oil recovery operations may begin.

As skimming vessels arrive, they will be organized to work in areas that allow for the most efficient vessel operation and free vessel movement in the recovery of oil. Vessel groups will vary in structure as determined by the Operations Section of the Unified Command, but will generally consist, at a minimum, of the following dedicated assets:

- 3 to 5 – Offshore skimming vessels (recovery)
- 1 – Tank barge (temporary storage)
- 1 – Air asset (tactical direction)
- 2 – Support vessels (crew/utility for supply)
- 6 to 10 – Boom vessels (enhanced booming)

Example *(**Note:** Actual organization of TFs will be dependent on several factors including, asset availability, weather, spilled oil migration, currents, etc.)*

The 95' FRV Breton Island out of Venice arrives on scene and conducts an initial site assessment. Air monitoring levels are acceptable and no other visual threats have been observed. The area is cleared for safe skimming operations. The Breton Island assumes command and control (CoC) of on-water recovery operations until a dedicated non-skimming vessel arrives to relieve it of those duties.

A second 95' FRV arrives and begins recovery operations alongside the Breton Island. Several more vessels begin to arrive, including a third 95' FRV out of Galveston, the HOSS Barge (High Volume Open Sea Skimming System) out of Harvey, a boom barge (CGA 300) with 25,000' of 42" auto boom out of Leeville, and 9 Fast Response Units (FRUs) from the load-out location at C-Port in Port Fourchon.

As these vessels set up and begin skimming, they are grouped into task forces (TFs) as directed by the Operations Section of the Unified Command located at the command post.

Initial set-up and potential actions:

- A 1,000 meter safety zone has been established around the incident location for vessels involved in Source Control
- The HOSS Barge is positioned facing the incident location just outside of this safety zone or at the point where the freshest oil is reaching the surface
- The HOSS Barge engages its Oil Spill Detection (OSD) system to locate the heaviest oil and maintains that ability for 24-hour operations

- The HOSS Barge deploys 1,320' of 67" Sea Sentry boom on each side, creating a swath width of 800'
- The Breton Island and H.I. Rich skim nearby, utilizing the same OSD systems as the HOSS Barge to locate and recover oil
- Two FRUs join this group and it becomes TF1
- The remaining 7 FRUs are split into a 2 and 3 vessel task force numbered TF2 and TF3
- A 95' FRV is placed in each TF
- The boom barge (CGA 300) is positioned nearby and begins deploying auto boom in sections between two utility vessels (1,000' to 3,000' of boom, depending on conditions) with chain-link gates in the middle to funnel oil to the skimmers
- The initial boom support vessels position in front of TF2 and TF3
- A 100,000+ barrel offshore tank barge is placed with each task force as necessary to facilitate the immediate offload of skimming vessels

The initial task forces (36 hours in) may be structured as follows:

TF 1

- 1 – 95' FRV
- 1 – HOSS Barge with 3 tugs
- 2 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

TF 2

- 1 – 95' FRV
- 4 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 10 – 500' sections of auto boom with gates
- 10 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

TF 3

- 1 – 95' FRV
- 3 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

Offshore skimming equipment continues to arrive in accordance with the ETA data listed in figure H.3a; this equipment includes 2 AquaGuard skimmers and 11 sets of Koseq Rigid Skimming Arms. These high volume heavy weather capable systems will be divided into functional groups and assigned to specific areas by the Operations Section of the Unified Command.

At this point of the response, the additional TFs may assume the following configurations:

TF 4

- 2 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – AquaGuard Skimmer
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

TF 5

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – AquaGuard Skimmer
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels

TF 6

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

TF 7

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

CGA Minimum Acceptable Capabilities for Vessels of Opportunity (VOO)
Minimum acceptable capabilities of Petroleum Industry Designed Vessels (PIDV) for conducting Vessel of Opportunity (VOO) skimming operations are shown in the table below. PIDVs are "purpose-built" to provide normal support to offshore oil and gas operators. They include but are not limited to utility boats, offshore supply vessels, etc. They become VOOs when tasked with oil spill response duties.

Capability	FRU	KOSEQ	AquaGuard
Type of Vessel	Utility Boat	Offshore Supply Vessel	Utility Boat
Operating parameters			
Sea State	3-5 ft max	9.8 ft max	3-5 ft max
Skimming speed	≤1 kt	≤3 kts	≤1 kt
Vessel size			
Minimum Length	100 ft	200 ft	100 ft
Deck space for: • Tank(s) • Crane(s) • Boom Reels • Hydraulic Power Units • Equipment Boxes	18x32 ft	100x40 ft	18x32 ft
Communication Assets	Marine Band Radio	Marine Band Radio	Marine Band Radio

Tactical use of Vessels of Opportunity (VOO): Kosmos will take all possible measures to maximize the oil-to-skimmer encounter rate of all skimming systems, to include VOOs, as discussed in this section. VOOs will normally be placed within an On-water recovery unit as shown in figures below.

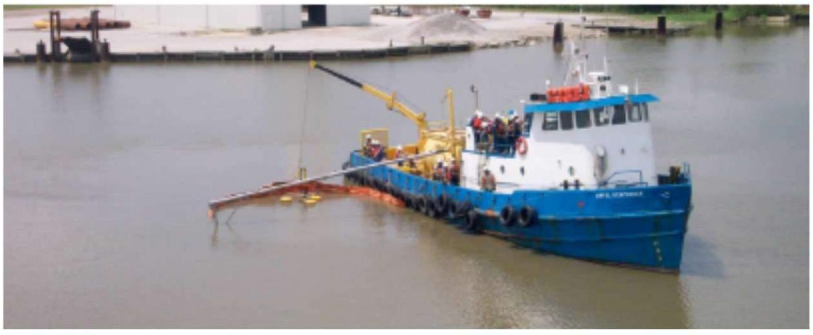
Skimming Operations: PIDVs are the preferred VOO skimming platform. OSROs are more versed in operating on these platforms and the vessels are generally large enough with crews more likely versed in spill response operations. They also have a greater possibility of having on-board storage capacity and the most likely vessels to be under contract, and therefore more readily available to the operator. These vessels would normally be assigned to an on-water recovery group/division (see figure below) and outfitted with a VOSS suited for their size and capabilities. Specific tactics used for skimming operations would be dependent upon many parameters which include, but are not limited to, safety concerns, weather, type VOSS on board, product being recovered, and area of oil coverage. Planners would deploy these assets with the objective of safely maximizing oil- to-skimmer encounter rate by taking actions to minimize non-skimming time and maximizing boom swath. Specific tactical configurations are shown in figures below.

The Fast Response Unit (FRU): A self-contained, skid based, skimming system that is deployed from the right side of a vessel of opportunity (VOO). An outrigger holds a 75' long section of air inflatable boom in place that directs oil to an apex for recovery via a Foilex 250 weir skimmer. The outrigger creates roughly a 40' swath width dependent on the VOO beam. The lip of the collection bowl on the skimmer is placed as close to the oil and water interface as possible to maximize oil recovery and minimize water retention. The skimmer then pumps all fluids recovered to the storage tank where it is allowed to settle, and with the approval of the Coast Guard, the water is decanted from the bottom of the tank back into the water ahead of the containment boom to be recycled through the system. Once the tank is full of as much pure recovered oil as possible it is offloaded to a storage barge for disposal in accordance with an approved disposal plan. A second 100 barrel storage tank can be added if the appropriate amount of deck space is available to use as secondary storage.

Tactical Overview

Mechanical Recovery – The FRU is designed to provide fast response skimming capability in the offshore and nearshore environment in a stationary or advancing mode. It provides a rated daily recovery capacity of 4,100 barrels. An additional boom reel with 440' of offshore boom can be deployed along with the FRU, and a second support vessel for boom towing, to extend the swath width when attached to the end of the fixed boom. The range and sustainability offshore is dependent on the VOO that the unit is placed on, but generally these can stay offshore for extended periods. The FRU works well independently or assigned with other on-water recovery assets in a task force. In either case, it is most effective when a designated aircraft is assigned to provide tactical direction to ensure the best placement in recoverable oil.
Maximum Sea Conditions – Under most circumstances the FRU can maintain standard oil spill recovery operations in 2' to 4' seas. Ultimately, the Coast Guard licensed Captain in charge of the VOO (with input from the CGAS Supervisor assigned) will be responsible to determine when the sea conditions have surpassed the vessel's safe operating capabilities.

Possible Task Force Configuration (Multiple VOOs can be deployed in a task force)
1 – VOO (100' to 165' Utility or Supply Vessel)
1 – Boom reel w/support vessel for towing
1 – Tank barge (offshore) for temporary storage
1 – Utility/Crewboat (supply)
1 – Designated spotter aircraft



The VOSS (yellow) is being deployed and connected to an out-rigged arm. This is suitable for collection in both large pockets of oil and for recovery of streaming oil. The oil-to-skimmer encounter rate is limited by the length of the arm. Skimming pace is ≤ 1 knot.

Through the use of an additional VOO, and using extended sea boom, the swath of the VOSS is increased therefore maximizing the oil-to-skimmer encounter rate. Skimming pace is ≤ 1 knot.

The Koseq Rigid Sweeping Arm: A skimming system deployed on a vessel of opportunity. It requires a large Offshore or Platform Supply Vessel (OSV/PSV), greater than 200' with at least 100' x 50' of free deck space. On each side of the vessel, a 50' long rigid framed Arm is deployed that consists of pontoon chambers to provide buoyancy, a smooth nylon face, and a hydraulically adjustable mounted weir skimmer. The Arm floats independently of the vessel and is attached by a tow bridle and a lead line. The movement of the vessel forward draws the rubber end seal of the arm against the hull to create a collection point for free oil directed to the weir by the Arm face. The collection weir is adjusted to keep the lip as close to the oil water interface as possible to maximize oil recovery while attempting to minimize excess water collection. A transfer pump (combination of positive displacement, screw type and centrifuge suited for highly viscous oils) pump the recovered liquid to portable tanks and/or dedicated fixed storage tanks onboard the vessel. After being allowed to sit and separate, with approval from the Coast Guard, the water can be decanted (pumped off) in front of the collection arm to be reprocessed through the system. Once full with as much pure recovered oil as possible, the oil is transferred to a temporary storage barge where it can be disposed of in accordance with an approved disposal plan.

Tactical Overview

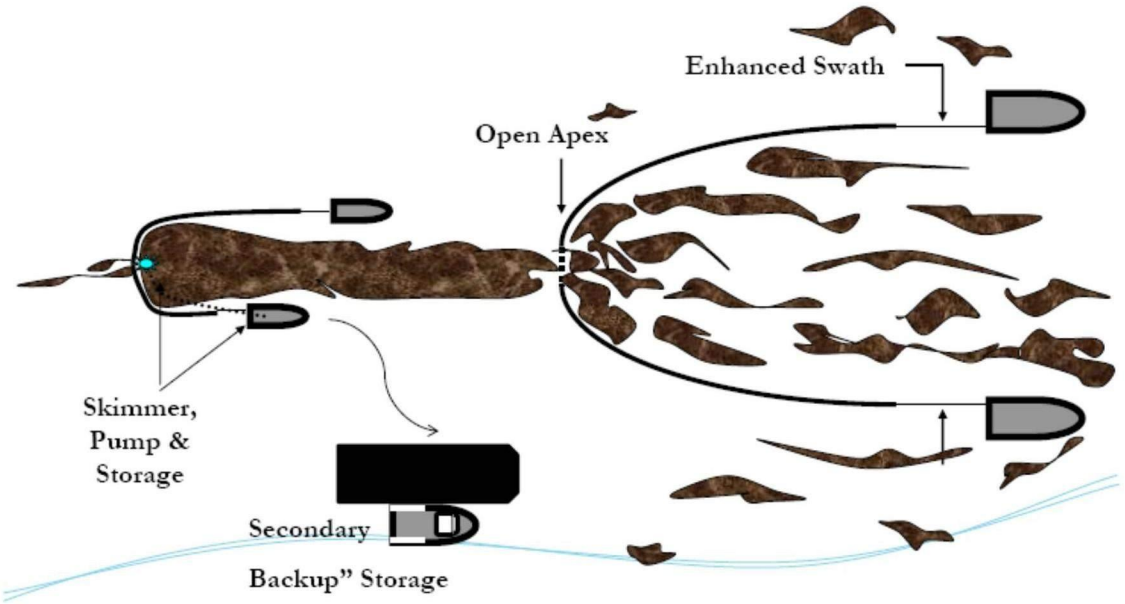
Mechanical Recovery – Deployed on large vessels of opportunity (VOO) the Koseq Rigid Sweeping Arms are high volume surge capacity deployed to increase recovery capacity at the source of a large oil spill in the offshore and outer nearshore environment of the Gulf of Mexico. They are highly mobile and sustainable in rougher sea conditions than normal skimming vessels (9.8' seas). The large Offshore Supply Vessels (OSV) required to deploy the Arms are able to remain on scene for extended periods, even when sea conditions pick up. Temporary storage on deck in portable tanks usually provides between 1,000 and 3,000 bbls. In most cases, the OSV will be able to pump 20% of its deadweight into the liquid mud tanks in accordance with the vessels Certificate of Inspection (COI). All storage can be offloaded utilizing the vessels liquid transfer system.

Maximum Sea Conditions - Under most circumstances the larger OSVs are capable of remaining on scene well past the Skimming Arms maximum sea state of 9.8'. Ultimately it will be the decision of the VOO Captain, with input from the T&T Supervisor onboard, to determine when the sea conditions have exceeded the safe operating conditions of the vessel.

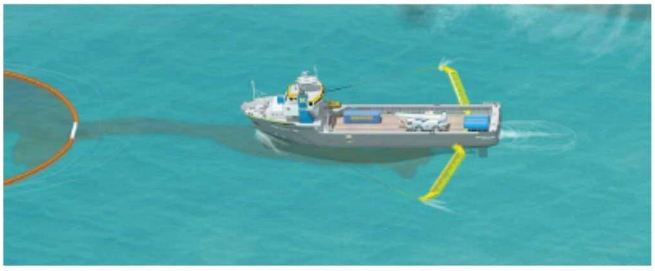
Command and Control – The large OSVs in many cases have state of the art communication and electronic systems, as well as the accommodations to support the function of directing all skimming operations offshore and reporting back to the command post.

Possible Task Force Configuration (Multiple Koseq VOOs can be deployed in a task force)

1 – $\geq$ 200' Offshore Supply Vessels (OSV) with set of Koseq Arms
2 to 4 portable storage tanks (500 bbl)
1 – Modular Crane Pedestal System set (MCPS) or 30 cherry picker (crane) for deployment
1 – Tank barge (offshore) for temporary storage
1 – Utility/Crewboat (supply)
1 – Designated spotter aircraft
4 – Personnel (4 T&T OSRO)



Scattered oil is "caught" by two VOO and collected at the apex of the towed sea boom. The oil moves thought a "gate" at that apex, forming a larger stream of oil which moves into the boom of the skimming vessel. Operations are paced at >1. A recovered oil barge stationed nearby to minimize time taken to offload recovered oil.



This is a depiction of the same operation as above but using KOSEQ Arms. In this configuration, the collecting boom speed dictates the operational pace at $\geq$ 1 knot to minimize entrainment of the oil.

Clean Gulf Associates (CGA) Procedure for Accessing Member-Contracted and other Vessels of Opportunity (VOOs) for Spill Response

- CGA has procedures in place for CGA member companies to acquire vessels of opportunity (VOOs) from an existing CGA member's contracted fleet or other sources for the deployment of CGA portable skimming equipment including Koseq Arms, Fast Response Units (FRUs) and any other portable skimming system(s) deemed appropriate for the response for a potential or actual oil spill, WCD oil spill or a Spill of National Significance (SONS).

- CGA uses Port Vision, a web-based vessel and terminal interface that empowers CGA to track vessels through Automatic Identification System (AIS) and terminal activities using a Geographic Information System (GIS). It provides live AIS/GIS views of waterways showing current vessel positions, terminals, created vessel fleets, and points-of-interest. Through this system, CGA has the ability to get instant snapshots of the location and status of all vessels contracted to CGA members, day or night, from any web-enabled PC.

Near Shore Response Actions

Timing

- Put near shore assets on standby and deployment in accordance with planning based on the actual situation, actual trajectories and oil budgets
- VOO identification and training in advance of spill nearing shoreline if possible
- Outfitting of VOOs for specific missions
- Deployment of assets based on actual movement of oil

Considerations

- Water depth, vessel draft
- Shoreline gradient
- State of the oil
- Use of VOOs
- Distance of surf zone from shoreline

Surveillance

- Provide trained observer to direct skimming operations
- Continual surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continual monitoring of vessel assets

Dispersant Use

- Generally will not be approved within 3 miles of shore or with less than 10 meters of water depth
- Approval would be at Regional Response Team level (Region 6)

Dedicated Near Shore skimming systems

- FRVs
- Egmopol and Marco SWS
- Operate with aerial spotter directing systems to observed oil slicks

VOO

- Use Kosmos's contracted resources as applicable
- Industry vessel are usually best for deployment of Vessel of Opportunity Skimming Systems (VOSS)
- Acquire additional resources as needed
- Consider use of local assets, i.e. fishing and pleasure craft
- Expect mission specific and safety training to be required
- Plan with the US Coast Guard for vessel inspections
- Operate with aerial spotter directing systems to oil patches

Shoreline Protection Operations

Response Planning Considerations

- Review appropriate Area Contingency Plan(s)
- Locate and review appropriate Geographic Response and Site Specific Plans
- Refer to appropriate Environmentally Sensitive Area Maps
- Capability for continual analysis of trajectories run periodically during the response
- Environmental risk assessments (ERA) to determine priorities for area protection
- Time to acquire personnel and equipment and their availability
- Refer to the State of Louisiana Initial Oil Spill Response Plan, Deep Water Horizon, dated 2 May 2010, as a secondary reference
- Aerial surveillance of oil movement
- Pre-impact beach cleaning and debris removal
- Shoreline Cleanup Assessment Team (SCAT) operations and reporting procedures
- Boom type, size and length requirements and availability
- Possibility of need for In-situ burning in near shore areas
- Current wildlife situation, especially status of migratory birds and endangered species in the area
- Check for Archeological sites and arrange assistance for the appropriate state agency when planning operations the may impact these areas

Placement of boom

- Position boom in accordance with the information gained from references listed above and based on the actual situation
- Determine areas of natural collection and develop booming strategies to move oil into those areas
- Assess timing of boom placement based on the most current trajectory analysis and the availability of each type of boom needed. Determine an overall booming priority and conduct booming operations accordingly. Consider:
    - Trajectories
    - Weather forecast
    - Oil Impact forecast
    - Verified spill movement
    - Boom, manpower and vessel (shallow draft) availability
    - Near shore boom and support material, (stakes, anchors, line)

Beach Preparation - Considerations and Actions

- Use of a 10 mile go/no go line to determine timing of beach cleaning
- SCAT reports and recommendations
- Determination of archeological sites and gaining authority to enter
- Monitoring of tide tables and weather to determine extent of high tides
- Pre cleaning of beaches by moving waste above high tide lines to minimize waste
- Determination of logistical requirements and arranging of waste removal and disposal

- Staging of equipment and housing of response personnel as close to the job site as possible to maximize on-site work time
- Boom tending, repair, replacement and security (use of local assets may be advantageous)
- Constant awareness of weather and oil movement for resource re-deployment as necessary
- Earthen berms and shoreline protection boom may be considered to protect sensitive inland areas
- Requisitioning of earth moving equipment
- Plan for efficient and safe use of personnel, ensuring:
    - A continual supply of the proper Personal Protective Equipment
    - Heating or cooling areas when needed
    - Medical coverage
    - Command and control systems (i.e. communications)
    - Personnel accountability measures
- Remediation requirements, i.e., replacement of sands, rip rap, etc.
- Availability of surface washing agents and associated protocol requirements for their use (see National Contingency Plan Product Schedule for list of possible agents)
- Discussions with all stakeholders, i.e., land owners, refuge/park managers, and others as appropriate, covering the following:
    - Access to areas
    - Possible response measures and impact of property and ongoing operations
    - Determination of any specific safety concerns
    - Any special requirements or prohibitions
    - Area security requirements
    - Handling of waste
    - Remediation expectations
    - Vehicle traffic control
    - Domestic animal safety concerns
    - Wildlife or exotic game concerns/issues

Inland and Coastal Marsh Protection and Response Considerations and Actions

- All considered response methods will be weighed against the possible damage they may do to the marsh. Methods will be approved by the Unified Command only after discussions with local Stakeholder, as identified above.
    - In-situ burn may be considered when marshes have been impacted
- Passive clean up of marshes should considered and appropriate stocks of sorbent boom and/or sweep obtained.
- Response personnel must be briefed on methods to traverse the marsh, i.e.,
    - use of appropriate vessel
    - use of temporary walkways or road ways
- Discuss and gain approval prior cutting or moving vessels through vegetation
- Discuss use of vessels that may disturb wildlife, i.e, airboats
- Safe movement of vessels through narrow cuts and blind curves

- Consider the possibility that no response in a marsh may be best
- In the deployment of any response asset, actions will be taken to ensure the safest, most efficient operations possible. This includes, but is not limited to:
    - Placement of recovered oil or waste storage as near to vessels or beach cleanup crews as possible.
    - Planning for stockage of high use items for expeditious replacement
    - Housing of personnel as close to the work site as possible to minimize travel time
    - Use of shallow water craft
    - Use of communication systems appropriate ensure command and control of assets
    - Use of appropriate boom in areas that I can offer effective protection
    - Planning of waste collection and removal to maximize cleanup efficiency
- Consideration or on-site remediation of contaminated soils to minimize replacement operations and impact on the area

Decanting Strategy

Recovered oil and water mixtures will typically separate into distinct phases when left in a quiescent state. When separation occurs, the relatively clean water phase can be siphoned or decanted back to the recovery point with minimal, if any, impact. Decanting therefore increases the effective on-site oil storage capacity and equipment operating time. FOSC/SOSC approval will be requested prior to decanting operations. This practice is routinely used for oil spill recovery.

CGA Equipment Limitations

The capability for any spill response equipment, whether a dedicated or portable system, to operate in differing weather conditions will be directly in relation to the capabilities of the vessel the system in placed on. Most importantly, however, the decision to operate will be based on the judgment of the Unified Command and/or the Captain of the vessel, who will ultimately have the final say in terminating operations. Skimming equipment listed below may have operational limits which exceed those safety thresholds. As was seen in the Deepwater Horizon (DWH) oil spill response, vessel skimming operations ceased when seas reached 5-6 feet and vessels were often recalled to port when those conditions were exceeded. Systems below are some of the most up-to-date systems available and were employed during the DWH spill.

Boom	3 foot seas, 20 knot winds
Dispersants	Winds more than 25 knots Visibility less than 3 nautical miles Ceiling less than 1,000 feet.
FRU	8 foot seas
HOSS Barge/OSRB	8 foot seas
Koseq Arms	8 foot seas
OSRV	4 foot seas

Environmental Conditions in the GOM

Prevailing winds, waves and currents along the Texas coast are from the southeast and northeast quadrants. Ten to 20 foot waves may occur during hurricanes. The combined effect of the winds, surface currents, and waves refracting shoreward produce the prevailing westerly longshore currents.

Tides are semi-diurnal and diurnal, and range in height from less than 1 foot to 2.5 feet. The direction, force, and duration of the wind has a considerable effect on the tides and currents. Fifteen foot tides may be expected during severe hurricanes and very low tides may accompany strong northerlies of long duration.

Surface water temperature averages slightly less than 90° F and ranges between 80 and 100° F during the late summer. During the winter the average is slightly less than 60° F and the range is between 35 and 80° F.

Louisiana is situated between the easterly and westerly wind belts, and therefore, experiences westerly winds during the winter and easterly winds in the summer. Average wind speed is generally 14-15 mph along the coast. Wave heights average 4 and 5 feet. However, during hurricane season, Louisiana has recorded wave heights ranging from 40 to 50 feet high and winds reaching speeds of 100 mph. Because much of southern Louisiana lies below sea level, flooding is prominent.

Surface water temperature ranges between 70 and 80 ° F during the summer months. During the winter, the average temperature will range from 50 and 60 ° F.

The Atlantic and Gulf of Mexico hurricane season is officially from 1 June to 30 November. 97% of all tropical activity occurs within this window. The Atlantic basin shows a very peaked season from August through October, with 78% of the tropical storm days, 87% of the minor (Saffir-Simpson Scale categories 1 and 2) hurricane days, and 96% of the major (Saffir-Simpson categories 3, 4 and 5) hurricane days occurring then. Maximum activity is in early to mid September. Once in a few years there may be a hurricane occurring "out of season" - primarily in May or December. Globally, September is the most active month and May is the least active month.

FIGURE 1
TRAJECTORY BY LAND SEGMENT

Trajectory of a spill and the probability of it impacting a land segment have been projected utilizing Kosmos's WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website using 30 day impact. The results are tabulated below.

Area/Block	OCS-G	Launch Area	Land Segment and/or Resource	Conditional Probability (%)
Drill and complete and/or TA 5 well locations **GB 491, Well No. 3** *144 miles from shore*	G35918	W19	Cameron, TX Kenedy, TX Kleberg, TX Nueces, TX Aransas, TX Calhoun, TX **Matagorda, TX** Brazoria, TX **Galveston, TX** Jefferson, TX **Cameron, LA** Vermilion, LA Iberia, LA Terrebonne, LA	1 2 2 1 2 3 **8** 4 **8** 4 **8** 2 1 1

WCD Scenario– <u>BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS</u> (144 miles from shore)
374,448 bbls of crude oil (Volume considering natural weathering)
API Gravity 31°

FIGURE 2 – Equipment Response Time to GB 491, Well No. 3

Surveillance Aircraft

Name/Type	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)						
Aero Commander	2	Houma, LA	2	2	1.2	5.5
T&T Marine (available through contract with CGA)						
CJ3 Citation	2	Houston/Galveston, TX	2	2	0.6	4.6

Dispersant Aircraft

Name/Type	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI (available through contract with CGA)							
Basler 67T	2000	2	Houma, LA	2	2	1.2	5.2
DC 3	1200	2	Houma, LA	2	2	1.5	5.5
DC 3	1200	2	Houma, LA	2	2	1.5	5.5
MSRC							
C-130 Spray AC	3,250	2	Kiln, MS	3	0	0.9	3.9
King Air BE90 Spray AC	250	2	Kiln, MS	3	0	1.5	4.5

Offshore Response

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
95' FRV	22885	249	NA	6	Galveston	2	0	2	7	1	12
95' FRV	22885	249	NA	6	Leeville	2	0	2	12	1	17
95' FRV	22885	249	NA	6	Venice	2	0	3	14	1	20
95' FRV	22885	249	NA	6	Vermilion	2	0	3	9	1	15
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville, LA	8	0	4	34	2	48
HOSS Barge	76285	4000	3 Tugs	8	Harvey, LA	6	0	12	25	2	45

Offshore Response, cont'd.

Offshore Equipment Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
MSRC											
S.T. Benz Responder LFF 100 Brush + OSRV *2,640' 67" Curtain Pressure Boom*	18086	4000	NA	10	Port Fourchon, LA	2	0	1	17	1	21
Florida Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Miami, FL	2	0	2	66	1	71
Gulf Coast Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Lake Charles, LA	2	0	4	12	1	19
Louisiana Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Fort Jackson, LA	2	0	4.5	25	1	32.5
Mississippi Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Pascagoula, MS	2	0	2	29	1	34
Southern Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Ingleside, TX	2	0	1	15	1	19
Texas Responder Transrec 350 + OSRV *2,640' 67" Curtain Pressure Boom*	10567	4000	NA	10	Galveston, TX	2	0	1	10	1	14
MSRC 360 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	36000	2 Tugs	9	Tampa, FL	2	0	2	84	1	89
MSRC 402 Offshore Barge 2 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	22244	40300	2 Tugs	9	Pascagoula, MS	2.5	0	3	50	1	56.5
MSRC 403 Offshore Barge 1 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	11122	40300	2 Tugs	9	Ingleside, TX	2.5	0	2	26	1	31.5
MSRC 452 Offshore Barge 1 Crucial Disk 88/30 1 Desmi Ocean *2,640' 67" Curtain Pressure Boom*	11122 3017	45000	2 Tugs	9	Fort Jackson, LA	2.5	0	6	44	1	53.5
MSRC 570 Offshore Barge 2 Crucial Disk 88/30 *2,640' 67" Curtain Pressure Boom*	22244	56900	2 Tugs	9	Galveston, TX	2.5	0	2	17.5	1	23

Offshore Response, cont'd.

Offshore Recovered Oil Storage Pre-determined Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	80000+	1 Tug	6	Venice, LA	20	0	4	35	1	60
RO Barge	NA	80000+	1 Tug	6	Venice, LA	20	0	4	35	1	60
RO Barge	NA	100000+	1 Tug	6	Venice, LA	20	0	4	35	1	60
RO Barge	NA	100000+	1 Tug	6	Venice, LA	20	0	4	35	1	60
RO Barge	NA	100000+	1 Tug	6	Venice, LA	20	0	4	35	1	60
RO Barge	NA	110000+	1 Tug	6	Venice, LA	20	0	4	35	1	60
RO Barge	NA	150000+	1 Tug	6	Venice, LA	20	0	4	35	1	60
RO Barge	NA	160000+	1 Tug	6	Venice, LA	20	0	4	35	1	60

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
CGA											
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Morgan City	2	6	3	20	1	32
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Vermilion	2	6	5.5	20	1	34.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	6	12	20	1	41
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	6	16.5	20	1	45.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Lake Charles	2	6	7	20	1	36
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Leeville	2	6	2	20	1	31
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	6	5	20	1	34
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	3	20	6	53
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston	4	12	12	20	2	50
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey	4	12	3	20	2	41
Koseq Skimming Arms (10) Lamor brush	228850	10000	5 OSV	30	Galveston	24	24	12	20	2	82
Koseq Skimming Arms (6) MariFlex 150 HF	108978	6000	3 OSV	18	Galveston	24	24	12	20	2	82
Koseq Skimming Arms (2) Lamor brush	45770	2000	1 OSV	6	Harvey	24	24	3	20	2	73
Koseq Skimming Arms (4) MariFlex 150 HF	72652	4000	2 OSV	12	Harvey	24	24	3	20	2	73

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
Crucial Disk 56/30 Skimmer (1)	5671	1000	1 Utility	5-9	Belle Chasse, LA	1	2	3	40	1	47
Crucial Disk 56/30 Skimmer (1)	5671	1000	1 Utility	5-9	Ingleside, TX	1	2	17	40	1	61
Crucial Disk 56/30 Skimmer (1)	5671	1000	1 Utility	5-9	Tampa, FL	1	2	22	40	1	66
Crucial Disk 88/30 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	11122	1000	1 PSV	9	Fort Jackson, LA	1	2	5	40	1	49
Crucial Disk 88/30 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	11122	1000	1 PSV	9	Fort Jackson, LA	1	2	5	40	1	49
Desmi Skimmer (1)	3017	1000	1 Utility	5-9	Lake Charles, LA	1	2	7	40	1	51
Desmi Skimmer (1)	3017	1000	1 Utility	5-9	Miami, FL	1	2	28	40	1	72
Foilex 200 Skimmer (1)	1989	1000	1 Utility	5-9	Belle Chasse, LA	1	2	3	40	1	47
Foilex 250 Skimmer (1)	3977	1000	1 Utility	5-9	Belle Chasse, LA	1	2	3	40	1	47
Foilex 250 Skimmer (1)	3977	1000	1 Utility	5-9	Galveston, TX	1	2	12	40	1	56
Foilex 250 Skimmer (1)	3977	1000	1 Utility	5-9	Ingleside, TX	1	2	17	40	1	61
Foilex 250 Skimmer (1)	3977	1000	1 Utility	5-9	Lake Charles, LA	1	2	7	40	1	41
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Baton Rouge, LA	1	2	4	40	1	48
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Belle Chasse, LA	1	2	3	40	1	47
GT-185 Skimmer w Adaptor (2)	2742	2000	2 Utility	10-18	Galveston, TX	1	2	12	40	1	56
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Ingleside, TX	1	2	17	40	1	61
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Lake Charles, LA	1	2	7	40	1	51
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Miami, FL	1	2	28	40	1	72
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Pascagoula, MS	1	2	6	40	1	50
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Port Arthur, TX	1	2	9	40	1	53
GT-185 Skimmer w Adaptor (1)	1371	1000	1 Utility	5-9	Tampa, FL	1	2	22	40	1	66
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Lake Charles, LA	1	2	7	40	1	51
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Lake Charles, LA	1	2	7	40	1	51
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Port Fourchon, LA	1	2	0	40	1	44
LFF 100 Brush Skimmer (1) *1,320' 67" Curtain Pressure Boom*	18086	1000	1 PSV	9	Port Fourchon, LA	1	2	0	40	1	44

Staging Area: Fourchon

Offshore Equipment Preferred Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
MSRC											
Stress I Skimmer (1)	15840	1000	1 Utility	5-9	Belle Chasse, LA	1	2	3	40	1	47
Stress I Skimmer (1)	15840	1000	1 Utility	5-9	Galveston, TX	1	2	12	40	1	56
Stress I Skimmer (1)	15840	1000	1 Utility	5-9	Ingleside, TX	1	2	17	40	1	61
Stress I Skimmer (2)	31680	2000	2 Utility	10-18	Lake Charles, LA	1	2	7	40	1	51
Stress I Skimmer (1)	15840	1000	1 Utility	5-9	Miami, FL	1	2	28	40	1	72
Stress I Skimmer (1)	15840	1000	1 Utility	5-9	Pascagoula, MS	1	2	6	40	1	50
Stress I Skimmer (1)	15840	1000	1 Utility	5-9	Port Fourchon, LA	1	2	0	40	1	44
Stress I Skimmer (1)	15840	1000	1 Utility	5-9	Tampa, FL	1	2	22	40	1	66
Stress II Skimmer (1)	3017	1000	1 Utility	5-9	Pascagoula, MS	1	2	6	40	1	50
Transrec 350 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	10567	1000	1 PSV	9	Houma, LA	1	2	2	40	1	46
Transrec 350 Skimmer (1) *1,320' 67" Curtain Pressure Boom*	10567	1000	1 PSV	9	Lake Charles, LA	1	2	7	40	1	51
Walosep W4 Skimmer (1)	3017	1000	1 Utility	5-9	Belle Chasse, LA	1	2	3	40	1	47
Walosep W4 Skimmer (1)	3017	1000	1 Utility	5-9	Galveston, TX	1	2	12	40	1	56
Walosep W4 Skimmer (1)	3017	1000	1 Utility	5-9	Miami, FL	1	2	28	40	1	72
67" Curtain Pressure Boom (24750')	NA	NA	7*	14	Houston, TX	1	2	11	40	1	55
67" Curtain Pressure Boom (1320')	NA	NA	2*	4	Belle Chasse, LA	1	2	3	40	1	47
67" Curtain Pressure Boom (1305')	NA	NA	2*	4	Pascagoula, MS	1	2	6	40	1	50
1000' Fire Resistant Boom	NA	NA	3*	6	Galveston, TX	1	4	12	40	6	63
2000' Fire Resistant Boom	NA	NA	3*	6	Lake Charles, LA	1	4	7	40	6	58
16000' Fire Resistant Boom	NA	NA	3*	6	Houston, TX	1	4	11	40	6	62

* *Utility Boats, Crew Boats, Supply Boats, or Fishing Vessels*

Nearshore Response

Nearshore Equipment	EDRC	Storage Capacity	Support Vessel(s)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Staging	Hrs to Deploy	Total Hrs
CGA											
46' FRV	15257	65	NA	4	Aransas Pass	2	0	2	16	1	21
46' FRV	15257	65	NA	4	Morgan City	2	0	2	6	1	11
46' FRV	15257	65	NA	4	Lake Charles	2	0	2	2.5	1	7.5
46' FRV	15257	65	NA	4	Venice	2	0	2	11	1	16
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Venice	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Galveston	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Morgan City	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Lake Charles	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Vermilion	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Galveston	2	0	N/A	48	1	51
MSRC											
30 ft. Kvichak *Marco I Skimmer (1)*	3588	24	NA	6	Ingleside, TX	1	1	2	10	0	14
30 ft. Kvichak *Marco I Skimmer (1)*	3588	24	NA	6	Galveston, TX	1	1	2	3	0	7
30 ft. Kvichak *Marco I Skimmer (1)*	3588	24	NA	6	Belle Chasse, LA	1	1	2	11	0	15
30 ft. Kvichak *Marco I Skimmer (1)*	3588	24	NA	6	Pascagoula, MS	1	1	2	16	0	20
MSRC Lightning 2 LORI Brush Pack	5000	50	NA	6	Tampa. FL	2	0	1	36	1	40
MSRC Quick Strike 2 LORI Brush Pack	5000	50	NA	6	Lake Charles, LA	2	0	1	2	1	6

Nearshore Response, cont'd.

Nearshore Equipment	EDRC	Storage Capacity	Support Vessel(s)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Staging	Hrs to Deploy	Total Hrs
Enterprise Marine (available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
CTCo 2604	NA	20000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
CTCo 2607	NA	23000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
CTCo 2609	NA	23000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
CTCo 5001	NA	47000	1 Tug	6	Amelia, LA	26	0	6	15	1	48
Kirby Offshore (available through contract with CGA and/or MSRC)											
RO Barge	NA	80000+	1 Tug	6	Venice, LA	24	0	4	31	1	60
RO Barge	NA	80000+	1 Tug	6	Venice, LA	24	0	4	31	1	60

Staging Area: Cameron

Nearshore and Inland Skimmers With Staging	EDRC	Storage Capacity	Support Vessel(s)	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	5	2	1	12
SWS Egmopol	1810	100	NA	3	Morgan City	2	2	4.5	2	1	11.5
SWS Marco	3588	20	NA	3	Lake Charles	2	2	2	2	1	9
SWS Marco	3588	34	NA	3	Leeville	2	2	7	2	1	14
SWS Marco	3588	34	NA	3	Venice	2	2	9.5	2	1	16.5
Foilex Skim Package (TDS 150)	1131	50	NA	3	Lake Charles	4	12	2	2	2	22
Foilex Skim Package (TDS 150)	1131	50	NA	3	Galveston	4	12	5	2	2	25
Foilex Skim Package (TDS 150)	1131	50	NA	3	Harvey	4	12	7	2	2	27
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Lake Charles	2	2	2	2	1	9
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	7	2	1	14
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Lake Charles	2	2	2	2	1	9
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	7	2	1	14
MSRC											
AardVac Skimmer (1)	3840	400	1 Utility	4	Lake Charles	1	1	1	2	0	5
AardVac Skimmer (1)	3840	400	1 Utility	4	Pascagoula	1	1	9.5	2	0	13.5
AardVac Skimmer (2)	7680	800	2 Utility	8	Miami, FL	1	1	31	2	0	35
Queensboro Skimmer (1)	905	400	1 Utility	4	Galveston	1	1	5	2	0	9
Queensboro Skimmer (5)	4525	2000	5 Utility	20	Lake Charles	1	1	1	2	0	5
Queensboro Skimmer (1)	905	400	1 Utility	4	Belle Chasse	1	1	7	2	0	11
Queensboro Skimmer (1)	905	400	1 Utility	4	Pascagoula	1	1	9.5	2	0	13.5
WP 1 Skimmer (1)	3017	400	1 Utility	4	Ingleside	1	1	9.5	2	0	13.5
WP 1 Skimmer (1)	3017	400	1 Utility	4	Pascagoula	1	1	9.5	2	0	13.5
WP 1 Skimmer (1)	3017	400	1 Utility	4	Tampa	1	1	25	2	0	29
WP 1 Skimmer (1)	3017	400	1 Utility	4	Miami	1	1	31	2	0	35

Shoreline Protection

Staging Area: Cameron

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment Site	Hrs to Deploy	Total Hrs
OMI Environmental (available through Letter of Intent)									
12,500' 18" Boom	6 Crew	12	New Iberia, LA	1	1	4	2	3	11
6,400' 18" Boom	3 Crew	6	Houston, TX	1	1	4	2	3	11
3,500' 18" Boom	2 Crew	4	Port Arthur, TX	1	1	2	2	3	9
8,000' 18" Boom	3 Crew	6	Port Allen, LA	1	1	5	2	3	12
1,000' 18" Boom	1 Crew	2	Hackberry, LA	1	1	1	2	3	8

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	7	1	2	14
Bird Scare Guns (24)	NA	NA	NA	2	Harvey	2	2	7	1	2	14
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	5	1	2	12
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	9.5	1	2	16.5
Bird Scare Guns (48)	NA	NA	NA	2	Lake Charles	2	2	2	1	2	9
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	7	1	2	14

Response Asset Totals	Total (bbls)
Offshore EDRC	1,194,343
Offshore Recovered Oil Storage	1,200,296+
Nearshore / Shallow Water EDRC	294,320
Nearshore / Shallow Water Recovered Oil Storage	370,437+

SECTION 9
ENVIRONMENTAL MONITORING INFORMATION

9.1 MONITORING SYSTEMS

Kosmos will monitor loop currents per the requirements set forth in NTL No. 2018-G01, "Ocean Current Monitoring."

9.2 INCIDENTAL TAKES

There is no reason to believe that any of the endangered species or marine mammals as listed in the Endangered Species Act (ESA) will be "taken" as a result of the operations proposed under this plan.

It has been documented that the use of explosives and or seismic devices can affect marine life. Operations proposed in this plan will not be utilizing either of these devices.

Kosmos will adhere to the requirements as set forth in the following documents, as applicable, to avoid or minimize impacts to any of the species listed in the ESA as a result of the operations conducted herein:

- NTL No. 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination"
- NTL No. 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
- NTL No. 2016-BOEM-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"

9.3 FLOWER GARDEN BANKS NATIONAL MARINE SANCTUARY

GB 491 and GB 492 are not located in the Flower Garden Banks National Marine Sanctuary; therefore, relevant information is not required in this EP.

SECTION 10
LEASE STIPULATIONS INFORMATION

Exploration activities are subject to the following stipulations attached to Leases OCS-G 35918 / 35919, Garden Banks Blocks 491 / 492.

10.1 MARINE PROTECTED SPECIES

In accordance with the Federal Endangered Species Act and the Marine Mammal Protection Act, Kosmos will:

(a) Collect and remove flotsam resulting from activities related to exploration, development, and production of this lease;

(b) Post signs in prominent places on all vessels and platforms used as a result of activities related to exploration, development, and production of this lease detailing the reasons (legal and ecological) why release of debris must be eliminated;

(c) Observe for marine mammals and sea turtles while on vessels, reduce vessel speed to 10 knots or less when assemblages of cetaceans are observed, and maintain a distance of 90 meters or greater from whales, and a distance of 45 meters or greater from small cetaceans and sea turtles;

(d) Employ mitigation measures prescribed by BOEM/BSEE or the National Marine Fisheries Service (NMFS) for all seismic surveys, including the use of an “exclusion zone” based upon the appropriate water depth, ramp-up and shutdown procedures, visual monitoring, and reporting;

(e) Identify important habitats, including designated critical habitat, used by listed species (e.g., sea turtle nesting beaches, piping plover critical habitat), in oil spill contingency planning and require the strategic placement of spill cleanup equipment to be used only by personnel trained in less-intrusive cleanup techniques on beaches and bay shores; and

(f) Immediately report all sightings and locations of injured or dead protected species (e.g., marine mammals and sea turtles) to the appropriate stranding network. If oil and gas industry activity is responsible for the injured or dead animal (e.g., because of a vessel strike), the responsible parties should remain available to assist the stranding network. If the injury or death was caused by a collision with the lessee’s vessel, the lessee must notify BOEM within 24 hours of the strike.

BOEM and BSEE issue Notices to Lessees (NTLs), which more fully describe measures implemented in support of the above-mentioned implementing statutes and regulations, as well as measures identified by the U.S. Fish and Wildlife Service and NMFS arising from, among others, conservation recommendations, rulemakings pursuant to the MMPA, or consultation. The lessee and its operators, personnel, and subcontractors, while undertaking activities authorized under this lease, must implement and comply with the specific mitigation measures outlined in NTL No. 2016-BOEM-G01, “Vessel Strike Avoidance and Injured/Dead Protected Species

Reporting;" NTL No. 2016-BOEM-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program;" and NTL No. 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination." At the lessee's option, the lessee, its operators, personnel, and contractors may comply with the most current measures to protect species in place at the time an activity is undertaken under this lease, including but not limited to new or updated versions of the NTLs identified in this paragraph. The lessee and its operators, personnel, and subcontractors will be required to comply with the mitigation measures, identified in the above referenced NTLs, and additional measures in the conditions of approvals for their plans or permits.

SECTION 11
ENVIRONMENTAL MITIGATION MEASURES INFORMATION

11.1 MEASURES TAKEN TO AVOID, MINIMIZE, AND MITIGATE IMPACTS

This plan does not propose activities for which the state of Florida is an affected state; therefore, mitigation information is not required for the activities proposed in this plan.

11.2 INCIDENTAL TAKES

Kosmos will adhere to the requirements set forth in the following documents, as applicable, to avoid or minimize impacts to any of the species listed in the Endangered Species Act (ESA) as a result of the operations conducted herein:

- NTL No. 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination"
- NTL No. 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
- NTL No. 2016-BOEM-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"

SECTION 12
SUPPORT VESSELS AND AIRCRAFT INFORMATION

12.1 GENERAL

The most practical, direct route from the shorebase as permitted by weather and traffic conditions will be utilized. Information regarding the vessels and aircraft to be used to support the proposed activities is provided in the table below.

Type	Maximum Fuel Tank Capacity	Maximum Number in Area at Any Time	Trip Frequency or Duration
Crew boat	1000 bbls	1	2 per week
Supply boat	6,000 bbls	1	2 per week
Helicopter	760 gals	1	Daily

12.2 DIESEL OIL SUPPLY VESSELS

Information regarding vessels to be used to supply diesel oil for fuel and other purposes is provided in the table below.

Size of Fuel Supply Vessel (ft)	Capacity of Fuel Supply Vessel	Frequency of Fuel Transfers	Route Fuel Supply Vessel Will Take
280’	6,000 bbls	Weekly	Shortest route from Shorebase to block
200’	500 bbls	Weekly	Shortest route from Shorebase to block

12.3 DRILLING FLUID TRANSPORTATION

Drilling fluid transportation information is not required to be submitted with this plan.

12.4 SOLID AND LIQUID WASTE TRANSPORTATION

A table, “Wastes You Will Transport and/or Dispose of Onshore,” is included as **Attachment 12-A.**

12.5 VICINITY MAP

A vicinity map showing the location of the activities proposed herein relative to the shoreline with the distance of the proposed activities from the shoreline and the primary route of the support vessels and aircraft that will be used when traveling between the onshore support facilities and the drilling unit is included as **Attachment 12-B.**

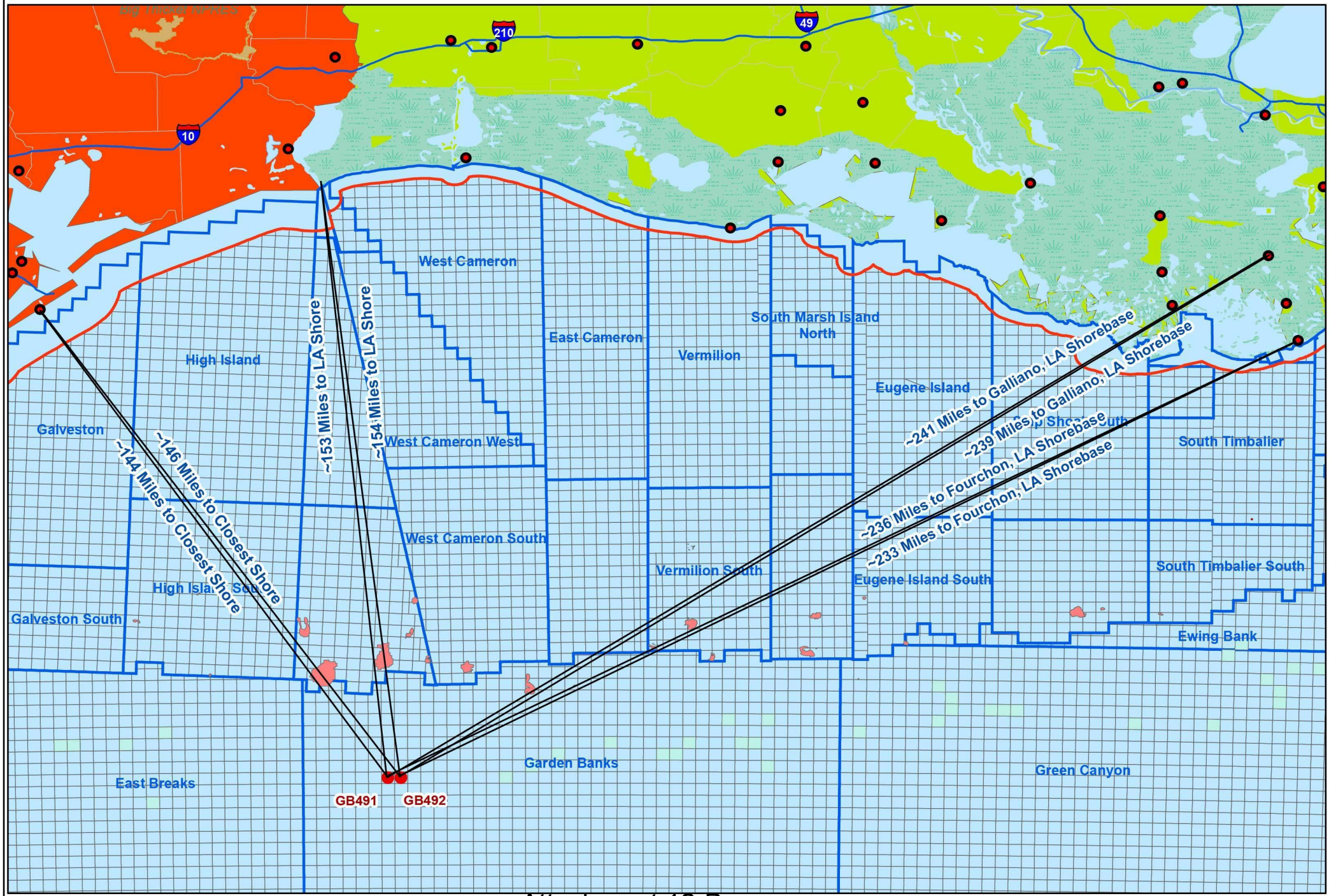
ATTACHMENT 12-A
WASTE AND SURPLUS ESTIMATED TO BE TRANSPORTED AND/OR DISPOSED OF ONSHORE

please specify whether the amount reported is a total or per well

	Projected generated waste		Solid and Liquid Wastes transportation	Waste Disposal		
Type of Waste	**Composition**		**Transport Method**	**Name/Location of Facility**	**Amount**	**Disposal Method**
Will drilling occur ? If yes, fill in the muds and cuttings.						
Oil-based drilling fluid or mud	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**
Synthetic-based drilling fluid or mud	internal olefin		Below deck storage tanks on offshore support vessels	M-I Swaco/Fourchon, LA	20,000 bbl/well	Recycled
Cuttings wetted with Water-based fluid	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**
Cuttings wetted with Synthetic-based fluid	Cuttings generated using synthetic based fluid		Below deck storage tanks on offshore support vessels	Ecoserv/Fourchon, LA	1,000 bbl/well	Disposed onshore
Cuttings wetted with oil-based fluids	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**
Will you produce hydrocarbons? If yes fill in for produced sand.						
Produced sand	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.						
Well Completion Fluids	CaBr2 / ZnBr2		Below-deck storage tanks on offshore support vessels	Ecoserv/Fourchon, LA	6,000 bbls/well	Disposed onshore
Workover Fluids	CaBr2 / ZnBr2		Below-deck storage tanks on offshore support vessels	Ecoserv/Fourchon, LA	6,000 bbls/well	Disposed onshore
Trash and debris	Non-hazardous trash & debris (non-recyclables)		Transport in DOT containers on supply vessels to shorebase	Progressive Waste Solutions of LA, Houma, LA	700 bbls/well	Disposed in landfill
Used oil	Used oil and glycol		Transport in DOT containers on supply vessels to shorebase	Safety Kleen System, Baton Rouge, LA	420 gal/well (10 bbls/well)	Recycled
Chemical product wastes	Paints, solvents, unused chemicals, etc.		Transport in DOT containers on supply vessels to shorebase	Safety Kleen System, Baton Rouge, LA	130 lbs/well	Recycled
NOTE: If you will not have a type of waste, enter NA in the row.						

Kosmos Energy Gulf of Mexico Operations, LLC

Vicinity Map
Garden Banks 491/492



Attachment 12-B

SECTION 13
ONSHORE SUPPORT FACILITIES INFORMATION

13.1 GENERAL

The onshore facilities that will be used to provide supply and service support for the proposed activities are provided in the table below.

Name	Location	Existing/New/Modified
Fourchon C-Port	Port Fourchon, LA	Existing
Bristow Heliport	Galliano, LA	Existing

13.2 SUPPORT BASE CONSTRUCTION OR EXPANSION

There will be no new construction of an onshore support base, nor will Kosmos expand the existing shorebase as a result of the operations proposed in this EP.

13.3 SUPPORT BASE CONSTRUCTION OR EXPANSION TIMETABLE

A support base construction or expansion timetable is not required for the activities proposed in this plan.

13.4 WASTE DISPOSAL

The Table, "Wastes You Will Transport and/or Dispose of Onshore, "is included as **Attachment 12-A.**

SECTION 14
COASTAL ZONE MANAGEMENT ACT (CZMA) INFORMATION

Under direction of the Coastal Zone Management Act (CZMA), the states of Louisiana and Texas developed a Coastal Zone Management Program (CZMP) to allow for the supervision of significant land and water use activities that take place within or that could significantly affect the Louisiana coastal zones.

Proposed activities are 153 miles from the Louisiana shore and 144 miles from the Texas shore. Measures will be taken to avoid or mitigate the probable impacts. Kosmos will operate in compliance with existing federal and state laws, regulations, and resultant enforceable program policies in Louisiana's and Texas' Coastal Zone Management Programs.

The OCS related oil and gas exploratory and development activities having potential impact on the Louisiana and Texas Coastal Zones are based on the location of the proposed facilities, access to those sites, best practical techniques for drilling locations, drilling equipment guidelines for the prevention of adverse environmental effects, effective environmental protection, emergency plans and contingency plans.

The policies and corresponding sections within this Exploration Plan identified by the state of Texas Coastal Management Plan (TCMP) as being related to OCS Plans are provided in the table below.

Relevant enforceable policies were considered in certifying consistency for Louisiana and Texas. Certificates of Coastal Zone Management Consistency for the states of Louisiana and Texas are included as **Attachments 14-A and 14-B**

Enforceable Program Policies of the Texas Coastal Management Plan (TCMP)

Policy	Plan Section	Evaluation
Category 2: Construction, Operation and Maintenance of Oil and Gas Exploration and Production Facilities	1 2	Proposed activities shall avoid to the maximum extent practicable significant impact to Texas submerged lands, critical areas, wetlands, beaches, or other coastal resources.
Category 3: Discharges of Wastewater and Disposal of Waste from Oil and Gas Exploration and Production Activities	6 12 13	All offshore discharges associated with the proposed activities, as summarized in Section 6, will be conducted in accordance with regulations implemented by the United States Environmental Protection Agency (USEPA), the U. S. Coast Guard (USCG), the Bureau of Ocean Energy Management (BOEM), and the Bureau of Safety and Environmental Enforcement (BSEE). All

Policy	Plan Section	Evaluation
		wastes generated during proposed activities that do not meet discharge regulations will be properly transported to Baton Rouge, Fourchon and Houma, Louisiana and disposed of as summarized in Section 12.
Category 4: Construction and Operation of Solid Waste Treatment, Storage, and Disposal Facilities	13	No construction of solid waste facilities and no expansion of existing facilities are proposed in the Texas coastal zone.
Category 5: Prevention, Response, and Remediation of Oil Spills	2 8	Proposed activities will comply with all applicable laws and regulations concerning oil spill prevention, response, and remediation summarized in Section 8. The proposed activities will be covered under the Kosmos approved Regional Oil Spill Response Plan (OSRP).
Category 6: Discharge of Municipal and Industrial Waste Water to Coastal Waters	6	No discharges to Texas coastal waters are proposed. The proposed activities will be conducted in accordance with discharge regulations implemented by the USEPA, the USCG, BOEM, and BSEE.
Category 7: Non Point Source Pollution	6	The proposed activities do not include nonpoint sources of water pollution.
Category 8: Development in Critical Areas	5 10 11 13 15	No activities are proposed in critical areas. Proposed activities shall avoid to the maximum extent practicable significant impact to critical areas.
Category 9: Construction of Waterfront Facilities and Other Structures on Submerge lands	2 7 13 15	No construction of waterfront facilities or other structures on Texas submerged lands is proposed.
Category 10: Dredging and Dredged Material Disposal and Placement	13	No dredging or dredged material disposal or placement is proposed.
Category 11: Construction in the Beach / Dune System	13	No construction in the beach/dune system is proposed.
Category 12: Development in Coastal Hazard Area	13	No development in coastal hazard areas is proposed.

Policy	Plan Section	Evaluation
Category 13: Development within Coastal Barrier Resource	13	No development within the Texas coastal barrier resource system is proposed.
Category 14: Development in State Parks, Wildlife Management Areas or Preserves	13	No development in Texas state parks, wildlife management areas, or preserves is proposed.
Category 15: Alteration of Coastal Historic Areas	5 15	The proposed activities do not include any development that would alter or disturb coastal historic areas.
Category 16: Transportation Projects	13	No transportation construction or maintenance projects are proposed.
Category 17: Emission of Air Pollutants	7 15	Air emissions associated with project activities are summarized in Section 7. The proposed activities will be conducted in conformance with applicable air quality laws, standards, and regulations and shall avoid to the maximum extent practicable significant impact to onshore air quality.
Category 18: Appropriations of Water	13	No appropriations, impoundments, or diversions of water resources are proposed.
Category 19: Levee and Control Projects	13	No levee or flood control projects are proposed.
Category 20: Marine Fishery Management	15	Proposed activities shall avoid to the maximum extent practicable significant impact to marine fisheries.
Category 22: Policies for Major Actions	15	The proposed activities are not a “major action” as defined by 501.15

Attachment 14-A

COASTAL ZONE MANAGEMENT

CONSISTENCY CERTIFICATION

JOINT / INITIAL EXPLORATION PLAN
GARDEN BANKS BLOCKS 491/492

OCS-G 35918 / 35919

The proposed activity complies with the enforceable policies of the Louisiana approved management program and will be conducted in a manner consistent with such program.

Kosmos Gulf of Mexico Operations, LLC (Company No. 03362)
Lessee or Operator

William F. Fisher – Vice President Operations

May 16, 2019

Attachment 14-B

COASTAL ZONE MANAGEMENT

CONSISTENCY CERTIFICATION

JOINT / INITIAL EXPLORATION PLAN
GARDEN BANKS BLOCKS 491/492

OCS-G 35918 / 35919

The proposed activity complies with the enforceable policies of the Texas approved management program and will be conducted in a manner consistent with such program.

Kosmos Gulf of Mexico Operations, LLC (Company No. 03362)
Lessee or Operator

William F. Fisher – Vice President Operations

May 16, 2019

SECTION 15
ENVIRONMENTAL IMPACT ANALYSIS

The Environmental Impact Analysis is included as **Attachment 15-A.**

SECTION 15
ENVIRONMENTAL IMPACT ANALYSIS

The Environmental Impact Analysis is included as **Attachment 15-A.**

Attachment 15-A

Kosmos Energy Gulf of Mexico Operations, LLC (Kosmos)

Initial Exploration Plan
Garden Banks Blocks 491 and 492
OCS-G 35918 / 35919

(A) IMPACT PRODUCING FACTORS

ENVIRONMENTAL IMPACT ANALYSIS WORKSHEET

Environment Resources	Impact Producing Factors (IPFs) Categories and Examples Refer to recent GOM OCS Lease Sale EIS for a more complete list of IPFs					
	Emissions (air, noise, light, etc.)	Effluents (muds, cutting, other discharges to the water column or seafloor)	Physical disturbances to the seafloor (rig or anchor emplacements, etc.)	Wastes sent to shore for treatment or disposal	Accidents (e.g., oil spills, chemical spills, H_2S releases)	Discarded Trash & Debris
Site-specific at Offshore Location						
Designated topographic features		(1)	(1)		(1)	
Pinnacle Trend area live bottoms		(2)	(2)		(2)	
Eastern Gulf live bottoms		(3)	(3)		(3)	
Benthic communities			(4)			
Water quality		X			X	
Fisheries		X			X	
Marine Mammals	X(8)	X			X(8)	X
Sea Turtles	X(8)	X			X(8)	X
Air quality	X(9)					
Shipwreck sites (known or potential)			(7)			
Prehistoric archaeological sites			(7)			
Vicinity of Offshore Location						
Essential fish habitat		X			X(6)	
Marine and pelagic birds					X	X
Public health and safety					(5)	
Coastal and Onshore						
Beaches					X(6)	X
Wetlands					X(6)	
Shore birds and coastal nesting birds					X6)	
Coastal wildlife refuges						
Wilderness areas						

Footnotes for Environmental Impact Analysis Matrix

1) Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well or platform site or any anchors will be on the seafloor within the:
   - 4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;
   - 1000-m, 1-mile or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an OCS lease;
   - Essential Fish Habitat (EFH) criteria of 500 ft. from any no-activity zone; or
   - Proximity of any submarine bank (500 ft. buffer zone) with relief greater than 2 meters that is not protected by the Topographic Features Stipulation attached to an OCS lease.
2) Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.
3) Activities within any Eastern Gulf OCS block where seafloor habitats are protected by the Live Bottom (Low-Relief) Stipulation attached to an OCS lease.
4) Activities on blocks designated by the BOEM as being in water depths 300 meters or greater.
5) Exploration or production activities where H2S concentrations greater than 500 ppm might be encountered.
6) All activities that could result in an accidental spill of produced liquid hydrocarbons or diesel fuel that you determine would impact these environmental resources. If the proposed action is located a sufficient distance from a resource that no impact would occur, the EIA can note that in a sentence or two.
7) All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or a prehistoric site that no impact would occur, the EIA can note that in a sentence or two.
8) All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.
9) Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.

(B) Analysis

Site-Specific at Garden Banks Blocks 491 and 492

Proposed operations consist of the drilling, completion, and / or abandonment of 5 locations (SL 1, SL 2, SL 3, SL 4, and SL 5).

The operations will be conducted with a drillship or dynamically-positioned semi-submersible.

1. Designated Topographic Features

Potential IPFs on topographic features include effluents and accidents.

Effluents: Garden Banks Blocks 491 and 492 are approximately 27 miles from the closest designated Topographic Features Stipulation Blocks (West Flower Gardens Bank and East Flower Gardens Bank); therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to benthic organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on corals. Because the crests of topographic features in the Northern Gulf of Mexico are found below 10 m, no oil from a surface spill could reach their sessile biota. Oil from a subsurface spill is not applicable due to the distance of these blocks from a topographic area. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for disposal) from the proposed activities, which could impact topographic features.

2. Pinnacle Trend Area Live Bottoms

Potential IPFs on pinnacle trend area live bottoms include effluents and accidents.

Effluents: Garden Banks Blocks 491 and 492 are approximately 332 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills have the potential to foul benthic communities and cause lethal and sublethal effects on live bottom organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several

orders of magnitude lower than the amount shown to have an effect on marine organisms. Oil from a subsurface spill is not applicable due to the distance of these blocks from a live bottom (pinnacle trend) area. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for disposal) from the proposed activities which could impact a live bottom (pinnacle trend) area.

3. Eastern Gulf Live Bottoms

Potential IPFs on Eastern Gulf live bottoms include effluents and accidents.

Effluents: Garden Banks Blocks 491 and 492 are not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to live bottom organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine invertebrates. Oil from a subsurface spill is not applicable due to the distance of these blocks from a live bottom area. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for disposal) from the proposed activities which could impact an Eastern Gulf live bottom area.

4. Benthic Communities

There are no IPFs (including emissions, physical disturbances to the seafloor, wastes sent to shore for disposal, or accidents) from the proposed activities that could cause impacts to benthic communities.

A drillship or dynamically-positioned semi-submersible is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a drillship or dynamically-positioned semi-submersible, Kosmos's proposed operations in Garden Banks Blocks 491 and 492 would not cause impacts to benthic communities.

5. Water Quality

IPFs that could result in water quality degradation from the proposed operations in Garden Banks Blocks 491 and 492 include effluents and accidents.

Effluents: Levels of contaminants in drilling muds and cuttings and produced water discharges, discharge-rate restrictions and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to water quality.

Accidents: Oil spills have the potential to alter offshore water quality; however, it is unlikely that an accidental surface or subsurface spill would occur from the proposed activities. Between 1980 and 2000, OCS operations produced 4.7 billion barrels of oil and spilled only 0.001 percent of this oil, or 1 bbl for every 81,000 bbl produced. The spill risk related to a diesel spill from drilling operations is even less. Between 1976 and 1985, (years for which data were collected), there were 80 reported diesel spills greater than one barrel associated with drilling activities. Considering that there were 11,944 wells drilled, this is a 0.7 percent probability of an occurrence. If a spill were to occur, the water quality of marine waters would be temporarily affected by the dissolved components and small oil droplets. Dispersion by currents and microbial degradation would remove the oil from the water column and dilute the constituents to background levels. Historically, changes in offshore water quality from oil spills have only been detected during the life of the spill and up to several months afterwards. Most of the components of oil are insoluble in water and therefore float. The activities proposed in this plan will be covered by Kosmos's Regional Oil Spill Response Plan (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor, and wastes sent to shore for disposal) from the proposed activities which could cause impacts to water quality.

6. Fisheries

IPFs that could cause impacts to fisheries as a result of the proposed operations in Garden Banks Blocks 491 and 492 include effluents and accidents.

Effluents: Effluents such as drilling fluids and cuttings discharges contain components and properties which are detrimental to fishery resources. Moderate petroleum and metal contamination of sediments and the water column can occur out to several hundred meters down-current from the discharge point. Offshore discharges are expected to disperse and dilute to very near background levels in the water column or on the seafloor within 3,000 m of the discharge point, and are expected to have negligible effect on fisheries.

Accidents: An accidental oil spill has the potential to cause some detrimental effects on fisheries; however, it is unlikely that such an event would occur from the proposed activities

(refer to **Item 5**, Water Quality). The effects of oil on mobile adult finfish or shellfish would likely be sublethal and the extent of damage would be reduced to the capacity of adult fish and shellfish to avoid the spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no IPFs from emissions, physical disturbances to the seafloor or wastes sent to shore for disposal from the proposed activities which could cause impacts to fisheries.

7. Marine Mammals

GulfCet II studies revealed that cetaceans of the continental shelf and shelf-edge were almost exclusively bottlenose dolphin and Atlantic spotted dolphin. Squid eaters, including dwarf and pygmy killer whale, Risso's dolphin, rough-toothed dolphin, and Cuvier's beaked whale, occurred most frequently along the upper slope in areas outside of anticyclones. IPFs that could cause impacts to marine mammals as a result of the proposed operations in Garden Banks Blocks 491 and 492 include emissions, effluents, discarded trash and debris, and accidents.

Emissions: Noises from drilling activities, support vessels and helicopters may elicit a startle reaction from marine mammals. This reaction may lead to disruption of marine mammals' normal activities. Stress may make them more vulnerable to parasites, disease, environmental contaminants, and/or predation (Majors and Myrick, 1990). There is little conclusive evidence for long-term displacements and population trends for marine mammals relative to noise.

Effluents: Drilling fluids and cuttings discharges contain components which may be detrimental to marine mammals. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in, and ingestion of debris have caused the death or serious injury of marine mammals (Laist, 1997; MMC, 1999). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm marine mammals. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and cetaceans would be unusual events, however should one occur, death or injury to marine mammals is possible. Contract vessel operators can avoid marine mammals and reduce potential deaths by maintaining a vigilant watch for marine mammals and maintaining a safe distance when they are sighted. Vessel personnel should use a Gulf of Mexico reference guide to help identify the twenty-one species of whales and dolphins, and the single species of manatee that may be encountered in the Gulf of Mexico OCS. Vessel personnel must report sightings of any injured or dead protected marine mammal species immediately, regardless of whether the injury or death is caused by their vessel, to the NMFS Southeast Marine Mammal Stranding Hotline at 1-877-433-8299 (http://www.nmfs.noaa.gov/pr/health/report.htm#southeast). Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with a contract vessel, the BOEM must be notified within 24 hours of the strike by email to protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

Oil spills have the potential to cause sublethal oil-related injuries and spill-related deaths to marine mammals. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to changes in cetacean behavior and/or distribution, thereby causing additional stress to the animals. The effect of oil dispersants on cetaceans is not known. The acute toxicity of oil dispersant chemicals included in Kosmos's OSRP is considered to be low when compared with the constituents and fractions of crude oils and diesel products. The activities proposed in this plan will be covered by Kosmos's OSRP (refer to information submitted in accordance with **Section 8**).

There are no other IPFs (including physical disturbances to the seafloor) from the proposed activities which could impact marine mammals.

8. Sea Turtles

IPFs that could cause impacts to sea turtles as a result of the proposed operations include emissions, effluents, discarded trash and debris, and accidents. GulfCet II studies sighted most

loggerhead, Kemp's ridley and leatherback sea turtles over shelf waters. Historically these species have been sighted up to the shelf's edge. They appear to be more abundant east of the Mississippi River than they are west of the river (Fritts et al., 1983b; Lohoefener et al., 1990). Deep waters may be used by all species as a transitory habitat.

Emissions: Noise from drilling activities, support vessels, and helicopters may elicit a startle reaction from sea turtles, but this is a temporary disturbance.

Effluents: Drilling fluids and cuttings discharges are not known to be lethal to sea turtles. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in, and ingestion of, debris have caused the death or serious injury of sea turtles (Balazs, 1985). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm sea turtles. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and sea turtles would be unusual events, however should one occur, death or injury to sea turtles is possible. Contract vessel operators can avoid sea turtles and reduce potential deaths by maintaining a vigilant watch for sea turtles and maintaining a safe distance when they are sighted. Vessel crews should use a reference guide to help identify the five species of sea turtles that may be encountered in the Gulf of Mexico OCS. Vessel crews must report sightings of any injured or dead protected sea turtle species immediately, regardless of whether the injury or death is caused by their vessel, to the State

Coordinators for the Sea Turtle Stranding and Salvage Network (STSSN) at http://www.sefsc.noaa.gov/species/turtles/stranding_coordinators.htm (phone numbers vary by state). Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with a contract vessel, the BOEM must be notified within 24 hours of the strike by email to protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

All sea turtle species and their life stages are vulnerable to the harmful effects of oil through direct contact or by fouling of their food. Exposure to oil can be fatal, particularly to juveniles and hatchlings. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to the possibility of collisions with sea turtles. The activities proposed in this plan will be covered by Kosmos's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Section 8**).

There are no other IPFs (including physical disturbances to the seafloor) from the proposed activities which could impact sea turtles.

9. Air Quality

The projected air emissions identified in **Section 7** are not expected to affect the OCS air quality primarily due to distance to the shore or to any Prevention of Significant Deterioration Class I air quality area such as the Breton Wilderness Area. Garden Banks Blocks 491 and 492 are located beyond the 200 kilometer (124 mile) buffer for the Breton Wilderness Area and are approximately 144 miles from the coastline. Therefore, no special mitigation, monitoring, or reporting requirements apply with respect to air emissions.

Accidents and blowouts can release hydrocarbons or chemicals, which could cause the emission of air pollutants. However, these releases would not impact onshore air quality because of the prevailing atmospheric conditions, emission height, emission rates, and the distances of Garden Banks Blocks 491 and 492 from the coastline. There are no other IPFs (including effluents, physical disturbances to the seafloor, wastes sent to shore for treatment or disposal) from the proposed activities which could impact air quality.

10. Shipwreck Sites (known or potential)

Potential IPFs that could impact known or unknown shipwreck sites as a result of the proposed operations in Garden Banks Blocks 491 and 492 include disturbances to the seafloor.

Physical disturbances to the seafloor: A drillship or dynamically-positioned semi-submersible is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a

drillship or dynamically-positioned semi-submersible, Kosmos's proposed operations in Garden Banks Blocks 491 and 492 would not cause impacts to shipwreck sites.

Additionally, Garden Banks Blocks 491 and 492 are not located in or adjacent to an OCS block designated by BOEM as having a high probability for occurrence of shipwrecks, therefore, no adverse impacts are expected.

There are no other IPFs (including emissions, effluents, wastes sent to shore for treatment or disposal, or accidents) from the proposed activities that could cause impacts to shipwreck sites.

11. Prehistoric Archaeological Sites

Potential IPFs that could cause impacts to prehistoric archaeological sites as a result of the proposed operations in Garden Banks Blocks 491 and 492 include disturbances to the seafloor.

Physical disturbances to the seafloor: A drillship or dynamically-positioned semi-submersible is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a drillship or dynamically-positioned semi-submersible, Kosmos's proposed operations in Garden Banks Blocks 491 and 492 would not cause impacts to prehistoric archaeological sites.

Additionally, Garden Banks Blocks 491 and 492 are located outside the Archaeological Prehistoric high probability line, therefore, no adverse impacts are expected.

There are no other IPFs (including emissions, effluents, wastes sent to shore for treatment or disposal, or accidents) from the proposed activities which could impact prehistoric archeological sites.

Vicinity of Offshore Location

1. Essential Fish Habitat (EFH)

IPFs that could cause impacts to EFH as a result of the proposed operations in Garden Banks Blocks 491 and 492 include effluents and accidents. EFH includes all estuarine and marine waters and substrates in the Gulf of Mexico.

Effluents: The Live Bottom Low Relief Stipulation, the Live Bottom (Pinnacle Trend) Stipulation, and the Eastern Gulf Pinnacle Trend Stipulation would prevent most of the potential impacts on live-bottom communities and EFH from operational waste discharges. Levels of contaminants in drilling muds and cuttings and produced-water discharges, discharge-rate restrictions, and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to EFH.

Accidents: An accidental oil spill has the potential to cause some detrimental effects on EFH. Oil spills that contact coastal bays and estuaries, as well as OCS waters when pelagic eggs and larvae are present, have the greatest potential to affect fisheries. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for treatment or disposal) from the proposed activities which could impact essential fish habitat.

2. Marine and Pelagic Birds

IPFs that could impact marine birds as a result of the proposed activities include air emissions, accidental oil spills, and discarded trash and debris from vessels and the facilities.

Emissions: Emissions of pollutants into the atmosphere from these activities are far below concentrations which could harm coastal and marine birds.

Accidents: An oil spill would cause localized, low-level petroleum hydrocarbon contamination. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Marine and pelagic birds feeding at the spill location may experience chronic, nonfatal, physiological stress. It is expected that few, if any, coastal and marine birds would actually be affected to that extent. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Marine and pelagic birds could become entangled and snared in discarded trash and debris, or ingest small plastic debris, which can cause permanent injuries and death. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos

management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE. Debris, if any, from these proposed activities will seldom interact with marine and pelagic birds; therefore, the effects will be negligible.

There are no other IPFs (including effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact marine and pelagic birds.

3. Public Health and Safety Due to Accidents.

There are no IPFs (emissions, effluents, physical disturbances to the seafloor, wastes sent to shore for treatment or disposal or accidents, including an accidental H_2S release) from the proposed activities which could cause impacts to public health and safety. In accordance with NTL No.'s 2008-G04, 2009-G27, and 2009-G31, sufficient information is included in **Section 4** to justify our request that our proposed activities be classified by BSEE as H_2S absent.

Coastal and Onshore

1. Beaches

IPFs from the proposed activities that could cause impacts to beaches include accidents (oil spills) and discarded trash and debris.

Accidents: Oil spills contacting beaches would have impacts on the use of recreational beaches and associated resources. Due to the distance from shore (144 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Trash on the beach is recognized as a major threat to the enjoyment and use of beaches. There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact beaches.

2. Wetlands

IPFs from the proposed activities that could cause impacts to wetlands include accidents (oil spills) and discarded trash and debris.

Accidents: It is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Due to the distance from shore (144 miles) and the response capabilities that would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact wetlands.

3. Shore Birds and Coastal Nesting Birds

Accidents: Oil spills could cause impacts to shore birds and coastal nesting birds. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Given the distance from shore (144 miles) and the response capabilities that would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Coastal and marine birds are highly susceptible to entanglement in floating, submerged, and beached marine debris: specifically plastics. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to shore birds and coastal nesting birds.

4. Coastal Wildlife Refuges

Accidents: An accidental oil spill from the proposed activities could cause impacts to coastal wildlife refuges. However, it is unlikely that an oil spill would occur from the proposed activities (refer to Item 5, Water Quality). Due to the distance from shore (144 miles) and the response capabilities that would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to coastal wildlife refuges.

5. Wilderness Areas

Accidents: An accidental oil spill from the proposed activities could cause impacts to wilderness areas. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Due to the distance from the nearest designated Wilderness Area (297 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8).**

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to wilderness areas.

6. Other Environmental Resources Identified

There are no other environmental resources identified for this impact assessment.

(C) IMPACTS ON PROPOSED ACTIVITIES

The site–specific environmental conditions have been taken into account for the proposed activities. No impacts are expected on the proposed activities from site-specific environmental conditions.

(D) ENVIRONMENTAL HAZARDS

During the hurricane season, June through November, the Gulf of Mexico is impacted by an average of ten tropical storms (39-73 mph winds), of which six become hurricanes (> 74 mph winds). Due to their locations in the gulf, Garden Banks Blocks 491 and 492 may experience hurricane and tropical storm force winds, and related sea currents. These factors can adversely impact the integrity of the operations covered by this plan. A significant storm may present physical hazards to operators and vessels, damage exploration or production equipment, or result in the release of hazardous materials (including hydrocarbons). Additionally, the displacement of equipment may disrupt the local benthic habitat and pose a threat to local species.

The following preventative measures included in this plan may be implemented to mitigate these impacts:

1. Drilling & completion
    a. Secure well
    b. Secure rig / platform
    c. Evacuate personnel

Drilling activities will be conducted in accordance with NTL No.'s 2008-G09, 2009-G10, and 2010-N10.

2. Structure Installation

Operator will not conduct structure installation operations during Tropical Storm or Hurricane threat.

(E) ALTERNATIVES

No alternatives to the proposed activities were considered to reduce environmental impacts.

(F) MITIGATION MEASURES

No mitigation measures other than those required by regulation will be employed to avoid, diminish, or eliminate potential impacts on environmental resources.

(G) CONSULTATION

No agencies or persons were consulted regarding potential impacts associated with the proposed activities. Therefore, a list of such entities has not been provided.

(H) PREPARER(S)

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(I) REFERENCES

Authors:

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Although not cited, the following were utilized in preparing this EIA:

- Hazard Surveys
- BOEM EIS's:
  - GOM Deepwater Operations and Activities. Environmental Assessment. BOEM 2000-001
  - GOM Central and Western Planning Areas Sales 166 and 168 Final Environmental Impact Statement. BOEM 96-0058.

Kosmos Energy Gulf of Mexico Operations, LLC (Kosmos)

Initial Exploration Plan
Garden Banks Blocks 491 and 492
OCS-G 35918 / 35919

(A) IMPACT PRODUCING FACTORS

ENVIRONMENTAL IMPACT ANALYSIS WORKSHEET

Environment Resources	Impact Producing Factors (IPFs) Categories and Examples Refer to recent GOM OCS Lease Sale EIS for a more complete list of IPFs					
	Emissions (air, noise, light, etc.)	**Effluents (muds, cutting, other discharges to the water column or seafloor)**	**Physical disturbances to the seafloor (rig or anchor emplacements, etc.)**	**Wastes sent to shore for treatment or disposal**	**Accidents (e.g., oil spills, chemical spills, H_2S releases)**	**Discarded Trash & Debris**
Site-specific at Offshore Location						
Designated topographic features		(1)	(1)		(1)	
Pinnacle Trend area live bottoms		(2)	(2)		(2)	
Eastern Gulf live bottoms		(3)	(3)		(3)	
Benthic communities			(4)			
Water quality		X			X	
Fisheries		X			X	
Marine Mammals	X(8)	X			X(8)	X
Sea Turtles	X(8)	X			X(8)	X
Air quality	X(9)					
Shipwreck sites (known or potential)			(7)			
Prehistoric archaeological sites			(7)			
Vicinity of Offshore Location						
Essential fish habitat		X			X(6)	
Marine and pelagic birds					X	X
Public health and safety					(5)	
Coastal and Onshore						
Beaches					X(6)	X
Wetlands					X(6)	
Shore birds and coastal nesting birds					X6)	
Coastal wildlife refuges						
Wilderness areas						

Footnotes for Environmental Impact Analysis Matrix

1) Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well or platform site or any anchors will be on the seafloor within the:
   - 4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;
   - 1000-m, 1-mile or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an OCS lease;
   - Essential Fish Habitat (EFH) criteria of 500 ft. from any no-activity zone; or
   - Proximity of any submarine bank (500 ft. buffer zone) with relief greater than 2 meters that is not protected by the Topographic Features Stipulation attached to an OCS lease.
2) Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.
3) Activities within any Eastern Gulf OCS block where seafloor habitats are protected by the Live Bottom (Low-Relief) Stipulation attached to an OCS lease.
4) Activities on blocks designated by the BOEM as being in water depths 300 meters or greater.
5) Exploration or production activities where H2S concentrations greater than 500 ppm might be encountered.
6) All activities that could result in an accidental spill of produced liquid hydrocarbons or diesel fuel that you determine would impact these environmental resources. If the proposed action is located a sufficient distance from a resource that no impact would occur, the EIA can note that in a sentence or two.
7) All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or a prehistoric site that no impact would occur, the EIA can note that in a sentence or two.
8) All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.
9) Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.

(B) Analysis

Site-Specific at Garden Banks Blocks 491 and 492

Proposed operations consist of the drilling, completion, and / or abandonment of 5 locations (SL 1, SL 2, SL 3, SL 4, and SL 5).

The operations will be conducted with a drillship or dynamically-positioned semi-submersible.

1. Designated Topographic Features

Potential IPFs on topographic features include effluents and accidents.

Effluents: Garden Banks Blocks 491 and 492 are approximately 27 miles from the closest designated Topographic Features Stipulation Blocks (West Flower Gardens Bank and East Flower Gardens Bank); therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to benthic organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on corals. Because the crests of topographic features in the Northern Gulf of Mexico are found below 10 m, no oil from a surface spill could reach their sessile biota. Oil from a subsurface spill is not applicable due to the distance of these blocks from a topographic area. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for disposal) from the proposed activities, which could impact topographic features.

2. Pinnacle Trend Area Live Bottoms

Potential IPFs on pinnacle trend area live bottoms include effluents and accidents.

Effluents: Garden Banks Blocks 491 and 492 are approximately 332 miles from the closest live bottom (pinnacle trend) area; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills have the potential to foul benthic communities and cause lethal and sublethal effects on live bottom organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several

orders of magnitude lower than the amount shown to have an effect on marine organisms. Oil from a subsurface spill is not applicable due to the distance of these blocks from a live bottom (pinnacle trend) area. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for disposal) from the proposed activities which could impact a live bottom (pinnacle trend) area.

3. Eastern Gulf Live Bottoms

Potential IPFs on Eastern Gulf live bottoms include effluents and accidents.

Effluents: Garden Banks Blocks 491 and 492 are not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to live bottom organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine invertebrates. Oil from a subsurface spill is not applicable due to the distance of these blocks from a live bottom area. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for disposal) from the proposed activities which could impact an Eastern Gulf live bottom area.

4. Benthic Communities

There are no IPFs (including emissions, physical disturbances to the seafloor, wastes sent to shore for disposal, or accidents) from the proposed activities that could cause impacts to benthic communities.

A drillship or dynamically-positioned semi-submersible is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a drillship or dynamically-positioned semi-submersible, Kosmos's proposed operations in Garden Banks Blocks 491 and 492 would not cause impacts to benthic communities.

5. Water Quality

IPFs that could result in water quality degradation from the proposed operations in Garden Banks Blocks 491 and 492 include effluents and accidents.

Effluents: Levels of contaminants in drilling muds and cuttings and produced water discharges, discharge-rate restrictions and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to water quality.

Accidents: Oil spills have the potential to alter offshore water quality; however, it is unlikely that an accidental surface or subsurface spill would occur from the proposed activities. Between 1980 and 2000, OCS operations produced 4.7 billion barrels of oil and spilled only 0.001 percent of this oil, or 1 bbl for every 81,000 bbl produced. The spill risk related to a diesel spill from drilling operations is even less. Between 1976 and 1985, (years for which data were collected), there were 80 reported diesel spills greater than one barrel associated with drilling activities. Considering that there were 11,944 wells drilled, this is a 0.7 percent probability of an occurrence. If a spill were to occur, the water quality of marine waters would be temporarily affected by the dissolved components and small oil droplets. Dispersion by currents and microbial degradation would remove the oil from the water column and dilute the constituents to background levels. Historically, changes in offshore water quality from oil spills have only been detected during the life of the spill and up to several months afterwards. Most of the components of oil are insoluble in water and therefore float. The activities proposed in this plan will be covered by Kosmos's Regional Oil Spill Response Plan (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor, and wastes sent to shore for disposal) from the proposed activities which could cause impacts to water quality.

6. Fisheries

IPFs that could cause impacts to fisheries as a result of the proposed operations in Garden Banks Blocks 491 and 492 include effluents and accidents.

Effluents: Effluents such as drilling fluids and cuttings discharges contain components and properties which are detrimental to fishery resources. Moderate petroleum and metal contamination of sediments and the water column can occur out to several hundred meters down-current from the discharge point. Offshore discharges are expected to disperse and dilute to very near background levels in the water column or on the seafloor within 3,000 m of the discharge point, and are expected to have negligible effect on fisheries.

Accidents: An accidental oil spill has the potential to cause some detrimental effects on fisheries; however, it is unlikely that such an event would occur from the proposed activities

(refer to **Item 5**, Water Quality). The effects of oil on mobile adult finfish or shellfish would likely be sublethal and the extent of damage would be reduced to the capacity of adult fish and shellfish to avoid the spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no IPFs from emissions, physical disturbances to the seafloor or wastes sent to shore for disposal from the proposed activities which could cause impacts to fisheries.

7. Marine Mammals

GulfCet II studies revealed that cetaceans of the continental shelf and shelf-edge were almost exclusively bottlenose dolphin and Atlantic spotted dolphin. Squid eaters, including dwarf and pygmy killer whale, Risso's dolphin, rough-toothed dolphin, and Cuvier's beaked whale, occurred most frequently along the upper slope in areas outside of anticyclones. IPFs that could cause impacts to marine mammals as a result of the proposed operations in Garden Banks Blocks 491 and 492 include emissions, effluents, discarded trash and debris, and accidents.

Emissions: Noises from drilling activities, support vessels and helicopters may elicit a startle reaction from marine mammals. This reaction may lead to disruption of marine mammals' normal activities. Stress may make them more vulnerable to parasites, disease, environmental contaminants, and/or predation (Majors and Myrick, 1990). There is little conclusive evidence for long-term displacements and population trends for marine mammals relative to noise.

Effluents: Drilling fluids and cuttings discharges contain components which may be detrimental to marine mammals. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in, and ingestion of debris have caused the death or serious injury of marine mammals (Laist, 1997; MMC, 1999). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm marine mammals. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and cetaceans would be unusual events, however should one occur, death or injury to marine mammals is possible. Contract vessel operators can avoid marine mammals and reduce potential deaths by maintaining a vigilant watch for marine mammals and maintaining a safe distance when they are sighted. Vessel personnel should use a Gulf of Mexico reference guide to help identify the twenty-one species of whales and dolphins, and the single species of manatee that may be encountered in the Gulf of Mexico OCS. Vessel personnel must report sightings of any injured or dead protected marine mammal species immediately, regardless of whether the injury or death is caused by their vessel, to the NMFS Southeast Marine Mammal Stranding Hotline at 1-877-433-8299 (http://www.nmfs.noaa.gov/pr/health/report.htm#southeast). Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with a contract vessel, the BOEM must be notified within 24 hours of the strike by email to protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

Oil spills have the potential to cause sublethal oil-related injuries and spill-related deaths to marine mammals. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to changes in cetacean behavior and/or distribution, thereby causing additional stress to the animals. The effect of oil dispersants on cetaceans is not known. The acute toxicity of oil dispersant chemicals included in Kosmos's OSRP is considered to be low when compared with the constituents and fractions of crude oils and diesel products. The activities proposed in this plan will be covered by Kosmos's OSRP (refer to information submitted in accordance with **Section 8**).

There are no other IPFs (including physical disturbances to the seafloor) from the proposed activities which could impact marine mammals.

8. Sea Turtles

IPFs that could cause impacts to sea turtles as a result of the proposed operations include emissions, effluents, discarded trash and debris, and accidents. GulfCet II studies sighted most

loggerhead, Kemp's ridley and leatherback sea turtles over shelf waters. Historically these species have been sighted up to the shelf's edge. They appear to be more abundant east of the Mississippi River than they are west of the river (Fritts et al., 1983b; Lohoefener et al., 1990). Deep waters may be used by all species as a transitory habitat.

Emissions: Noise from drilling activities, support vessels, and helicopters may elicit a startle reaction from sea turtles, but this is a temporary disturbance.

Effluents: Drilling fluids and cuttings discharges are not known to be lethal to sea turtles. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in, and ingestion of, debris have caused the death or serious injury of sea turtles (Balazs, 1985). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm sea turtles. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and sea turtles would be unusual events, however should one occur, death or injury to sea turtles is possible. Contract vessel operators can avoid sea turtles and reduce potential deaths by maintaining a vigilant watch for sea turtles and maintaining a safe distance when they are sighted. Vessel crews should use a reference guide to help identify the five species of sea turtles that may be encountered in the Gulf of Mexico OCS. Vessel crews must report sightings of any injured or dead protected sea turtle species immediately, regardless of whether the injury or death is caused by their vessel, to the State

Coordinators for the Sea Turtle Stranding and Salvage Network (STSSN) at http://www.sefsc.noaa.gov/species/turtles/stranding_coordinators.htm (phone numbers vary by state). Any injured or dead protected species should also be reported to takereport.nmfsser@noaa.gov. In addition, if the injury or death was caused by a collision with a contract vessel, the BOEM must be notified within 24 hours of the strike by email to protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

All sea turtle species and their life stages are vulnerable to the harmful effects of oil through direct contact or by fouling of their food. Exposure to oil can be fatal, particularly to juveniles and hatchlings. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to the possibility of collisions with sea turtles. The activities proposed in this plan will be covered by Kosmos's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Section 8**).

There are no other IPFs (including physical disturbances to the seafloor) from the proposed activities which could impact sea turtles.

9. Air Quality

The projected air emissions identified in **Section 7** are not expected to affect the OCS air quality primarily due to distance to the shore or to any Prevention of Significant Deterioration Class I air quality area such as the Breton Wilderness Area. Garden Banks Blocks 491 and 492 are located beyond the 200 kilometer (124 mile) buffer for the Breton Wilderness Area and are approximately 144 miles from the coastline. Therefore, no special mitigation, monitoring, or reporting requirements apply with respect to air emissions.

Accidents and blowouts can release hydrocarbons or chemicals, which could cause the emission of air pollutants. However, these releases would not impact onshore air quality because of the prevailing atmospheric conditions, emission height, emission rates, and the distances of Garden Banks Blocks 491 and 492 from the coastline. There are no other IPFs (including effluents, physical disturbances to the seafloor, wastes sent to shore for treatment or disposal) from the proposed activities which could impact air quality.

10. Shipwreck Sites (known or potential)

Potential IPFs that could impact known or unknown shipwreck sites as a result of the proposed operations in Garden Banks Blocks 491 and 492 include disturbances to the seafloor.

Physical disturbances to the seafloor: A drillship or dynamically-positioned semi-submersible is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a

drillship or dynamically-positioned semi-submersible, Kosmos's proposed operations in Garden Banks Blocks 491 and 492 would not cause impacts to shipwreck sites.

Additionally, Garden Banks Blocks 491 and 492 are not located in or adjacent to an OCS block designated by BOEM as having a high probability for occurrence of shipwrecks, therefore, no adverse impacts are expected.

There are no other IPFs (including emissions, effluents, wastes sent to shore for treatment or disposal, or accidents) from the proposed activities that could cause impacts to shipwreck sites.

11. Prehistoric Archaeological Sites

Potential IPFs that could cause impacts to prehistoric archaeological sites as a result of the proposed operations in Garden Banks Blocks 491 and 492 include disturbances to the seafloor.

Physical disturbances to the seafloor: A drillship or dynamically-positioned semi-submersible is being used for the proposed activities; therefore, only an insignificant amount of seafloor will be disturbed. Because physical disturbances to the seafloor will be minimized by the use of a drillship or dynamically-positioned semi-submersible, Kosmos's proposed operations in Garden Banks Blocks 491 and 492 would not cause impacts to prehistoric archaeological sites.

Additionally, Garden Banks Blocks 491 and 492 are located outside the Archaeological Prehistoric high probability line, therefore, no adverse impacts are expected.

There are no other IPFs (including emissions, effluents, wastes sent to shore for treatment or disposal, or accidents) from the proposed activities which could impact prehistoric archeological sites.

Vicinity of Offshore Location

1. Essential Fish Habitat (EFH)

IPFs that could cause impacts to EFH as a result of the proposed operations in Garden Banks Blocks 491 and 492 include effluents and accidents. EFH includes all estuarine and marine waters and substrates in the Gulf of Mexico.

Effluents: The Live Bottom Low Relief Stipulation, the Live Bottom (Pinnacle Trend) Stipulation, and the Eastern Gulf Pinnacle Trend Stipulation would prevent most of the potential impacts on live-bottom communities and EFH from operational waste discharges. Levels of contaminants in drilling muds and cuttings and produced-water discharges, discharge-rate restrictions, and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to EFH.

Accidents: An accidental oil spill has the potential to cause some detrimental effects on EFH. Oil spills that contact coastal bays and estuaries, as well as OCS waters when pelagic eggs and larvae are present, have the greatest potential to affect fisheries. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

There are no other IPFs (including emissions, physical disturbances to the seafloor and wastes sent to shore for treatment or disposal) from the proposed activities which could impact essential fish habitat.

2. Marine and Pelagic Birds

IPFs that could impact marine birds as a result of the proposed activities include air emissions, accidental oil spills, and discarded trash and debris from vessels and the facilities.

Emissions: Emissions of pollutants into the atmosphere from these activities are far below concentrations which could harm coastal and marine birds.

Accidents: An oil spill would cause localized, low-level petroleum hydrocarbon contamination. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Marine and pelagic birds feeding at the spill location may experience chronic, nonfatal, physiological stress. It is expected that few, if any, coastal and marine birds would actually be affected to that extent. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Marine and pelagic birds could become entangled and snared in discarded trash and debris, or ingest small plastic debris, which can cause permanent injuries and death. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos

management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE. Debris, if any, from these proposed activities will seldom interact with marine and pelagic birds; therefore, the effects will be negligible.

There are no other IPFs (including effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact marine and pelagic birds.

3. Public Health and Safety Due to Accidents.

There are no IPFs (emissions, effluents, physical disturbances to the seafloor, wastes sent to shore for treatment or disposal or accidents, including an accidental H_2S release) from the proposed activities which could cause impacts to public health and safety. In accordance with NTL No.'s 2008-G04, 2009-G27, and 2009-G31, sufficient information is included in **Section 4** to justify our request that our proposed activities be classified by BSEE as H_2S absent.

Coastal and Onshore

1. Beaches

IPFs from the proposed activities that could cause impacts to beaches include accidents (oil spills) and discarded trash and debris.

Accidents: Oil spills contacting beaches would have impacts on the use of recreational beaches and associated resources. Due to the distance from shore (144 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Trash on the beach is recognized as a major threat to the enjoyment and use of beaches. There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact beaches.

2. Wetlands

IPFs from the proposed activities that could cause impacts to wetlands include accidents (oil spills) and discarded trash and debris.

Accidents: It is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Due to the distance from shore (144 miles) and the response capabilities that would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact wetlands.

3. Shore Birds and Coastal Nesting Birds

Accidents: Oil spills could cause impacts to shore birds and coastal nesting birds. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Given the distance from shore (144 miles) and the response capabilities that would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Coastal and marine birds are highly susceptible to entanglement in floating, submerged, and beached marine debris: specifically plastics. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to shore birds and coastal nesting birds.

4. Coastal Wildlife Refuges

Accidents: An accidental oil spill from the proposed activities could cause impacts to coastal wildlife refuges. However, it is unlikely that an oil spill would occur from the proposed activities (refer to Item 5, Water Quality). Due to the distance from shore (144 miles) and the response capabilities that would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8**).

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to coastal wildlife refuges.

5. Wilderness Areas

Accidents: An accidental oil spill from the proposed activities could cause impacts to wilderness areas. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Due to the distance from the nearest designated Wilderness Area (297 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Kosmos's Regional OSRP (refer to information submitted in **Section 8).**

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Kosmos will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Kosmos management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to wilderness areas.

6. Other Environmental Resources Identified

There are no other environmental resources identified for this impact assessment.

(C) IMPACTS ON PROPOSED ACTIVITIES

The site–specific environmental conditions have been taken into account for the proposed activities. No impacts are expected on the proposed activities from site-specific environmental conditions.

(D) ENVIRONMENTAL HAZARDS

During the hurricane season, June through November, the Gulf of Mexico is impacted by an average of ten tropical storms (39-73 mph winds), of which six become hurricanes (> 74 mph winds). Due to their locations in the gulf, Garden Banks Blocks 491 and 492 may experience hurricane and tropical storm force winds, and related sea currents. These factors can adversely impact the integrity of the operations covered by this plan. A significant storm may present physical hazards to operators and vessels, damage exploration or production equipment, or result in the release of hazardous materials (including hydrocarbons). Additionally, the displacement of equipment may disrupt the local benthic habitat and pose a threat to local species.

The following preventative measures included in this plan may be implemented to mitigate these impacts:

1. Drilling & completion
    a. Secure well
    b. Secure rig / platform
    c. Evacuate personnel

Drilling activities will be conducted in accordance with NTL No.'s 2008-G09, 2009-G10, and 2010-N10.

2. Structure Installation

Operator will not conduct structure installation operations during Tropical Storm or Hurricane threat.

(E) ALTERNATIVES

No alternatives to the proposed activities were considered to reduce environmental impacts.

(F) MITIGATION MEASURES

No mitigation measures other than those required by regulation will be employed to avoid, diminish, or eliminate potential impacts on environmental resources.

(G) CONSULTATION

No agencies or persons were consulted regarding potential impacts associated with the proposed activities. Therefore, a list of such entities has not been provided.

(H) PREPARER(S)

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Although not cited, the following were utilized in preparing this EIA:

- Hazard Surveys
- BOEM EIS's:
  - GOM Deepwater Operations and Activities. Environmental Assessment. BOEM 2000-001
  - GOM Central and Western Planning Areas Sales 166 and 168 Final Environmental Impact Statement. BOEM 96-0058.

SECTION 16
ADMINISTRATIVE INFORMATION

16.1 EXEMPTED INFORMATION DESCRIPTION

The proposed bottomhole locations of the planned wells have been removed from the Public Information copy of this EP as well as any discussions of the target objectives, geologic or geophysical data, and interpreted geology.

16.2 BIBLIOGRAPHY

1. Geoscience Earth & Marine Services, Inc., Shallow Hazards Assessment, Blocks 491 and 492, Garden Banks Area, Gulf of Mexico, Project No.: 0419-2846.
2. Archaeological Assessment Resolution Prospect Area, Blocks 491, 492, 535, and 536 Garden Banks Area, Gulf of Mexico, 17 July 2018, Fugro Document No.: 02.1803-1355-Resolution.
3. Oil Spill Response Plan, O-1037.